
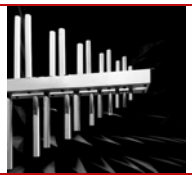
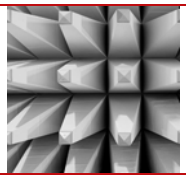

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Test report no.: 1-5623/12-01-08-C

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing: Radio/Satellite Communications

Applicant

beyerdynamic GmbH & Co. KG
Theresienstraße 8
74072 Heilbronn / GERMANY
Phone: +49 7131 617-0
Fax: +49 7131 617-215
Contact: Ulrich Roth
e-mail: roth@beyerdynamic.de
Phone: +49 7131 617-155

Manufacturer

beyerdynamic GmbH & Co. KG
Theresienstraße 8
74072 Heilbronn / GERMANY

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item:	**Discussion unit**
Model name:	**Quinta MU 31 and Quinta MU 33**
FCC ID:	**OSDQUINTAMU3X**
IC:	**3628A-QUINTAMU3X**
Frequency:	DTS band 5725 MHz to 5850 MHz (lowest channel 5736 MHz, highest channel 5814 MHz)
Technology tested:	DSSS
Antenna:	2 integrated antennas
Power Supply:	110 / 10V AC by external power supply / DC by internal battery
Temperature:	+22

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test report authorised:

cn=Marco Bertolino, o=CETECOM ICT Services GmbH, ou=BTL-100826, email=marco.bertolino@cetecom.com, c=DE
2013.10.29 08:12:18 +01'00'

Marco Bertolino
Testing Manager

Test performed:

cn=Tobias Wittenmeier, o=CETECOM ICT Services GmbH, ou=WIT-111222, email=tobias.wittenmeier@cetecom.com, c=DE
2013.10.29 08:00:51 +01'00'

Tobias Wittenmeier
Expert

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.
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In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2013-02-26
Date of receipt of test item:	2013-05-13
Start of test:	2013-05-13
End of test:	2013-10-27
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2012-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

3.1 Measurement guidance

DTS : KDB 558074	2013-04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	-/- °C during high temperature tests
	T_{min}	-/- °C during low temperature tests
Relative humidity content:		46 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	110 / 10 V AC by external power supply / DC by internal battery
	V_{max}	99 V
	V_{min}	121 V

5 Test item

Kind of test item	**:**	**Discussion unit**
Type identification	**:**	**Quinta MU 31 and Quinta MU 33**
S/N serial number	**:**	**Radiated unit: 00001** **Conducted unit: 00006**
HW hardware status	**:**	**Rev. 1**
SW software status	**:**	**1.0.33**
Frequency band [MHz]	**:**	**DTS band 5725 MHz to 5850 MHz** **(lowest channel 5736 MHz; highest channel 5814 MHz)**
Type of radio transmission **Use of frequency spectrum**	**:** **:**	**DSSS**
Type of modulation	**:**	**BPSK, QPSK**
Number of channels	**:**	**3 (test mode)**
Antenna	**:**	**2 integrated antennas**
Power supply	**:**	**110 / 10 V** **AC by external power supply / DC by internal battery**
Temperature range	**:**	**No range needed!**

5.1 Additional information

Test setup - and EUT - photos are included in the following test reports:

External EUT photos: 1-5623/12-01-01_AnnexA
Internal EUT photos: 1-5623/12-01-01_AnnexB
Test setup: 1-5623/12-01-01_AnnexD

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒ **No deviations from the technical specifications were ascertained**

☐ There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 8	Passed	2013-10-29	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density DTS clause 10.2	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth - 6dB bandwidth DTS clause 8.2	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth - 20dB bandwidth	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power DTS clause 9.1.2	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted DTS clause 13.2.1	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted DTS clause 11.1 & 2	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.109 RSS-Gen	RX spurious emissions radiated	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.107(a) §15.207(a)	Conducted emissions < 30 MHz	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

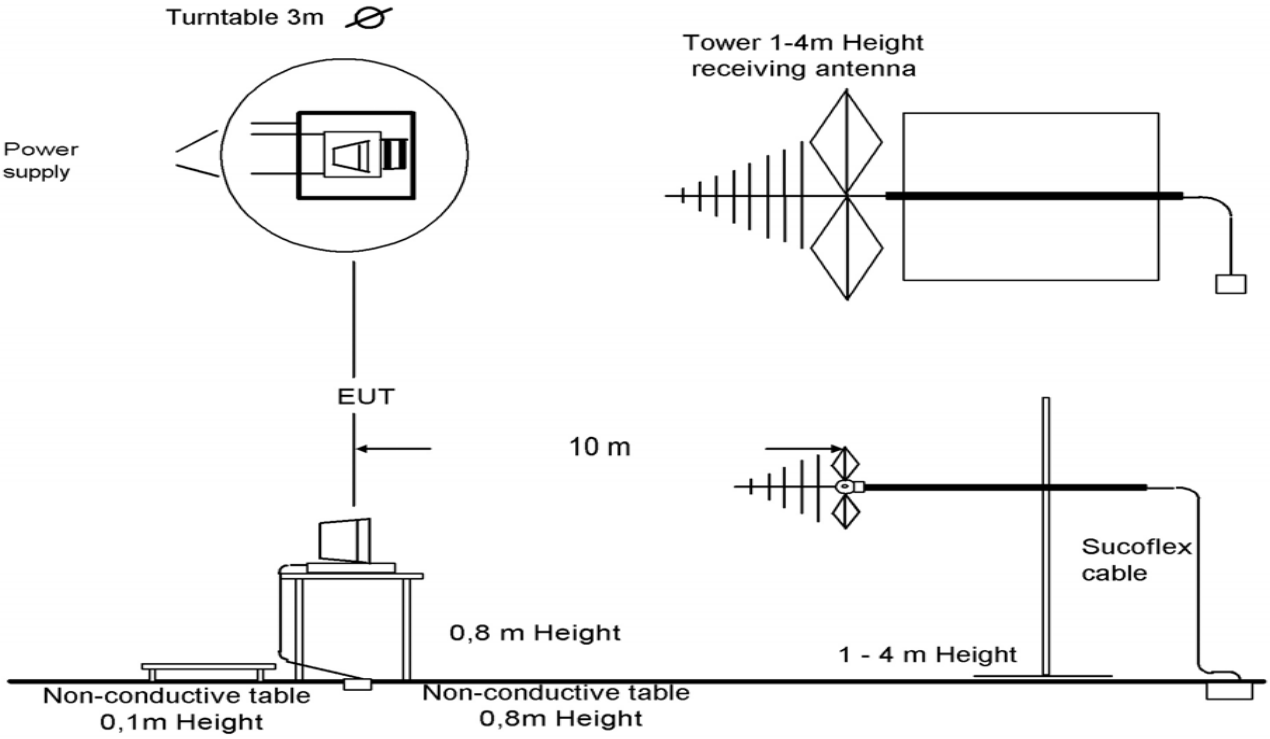
8 RF measurements

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63. Antennas are confirmed with ANSI C63.

Semi anechoic chamber



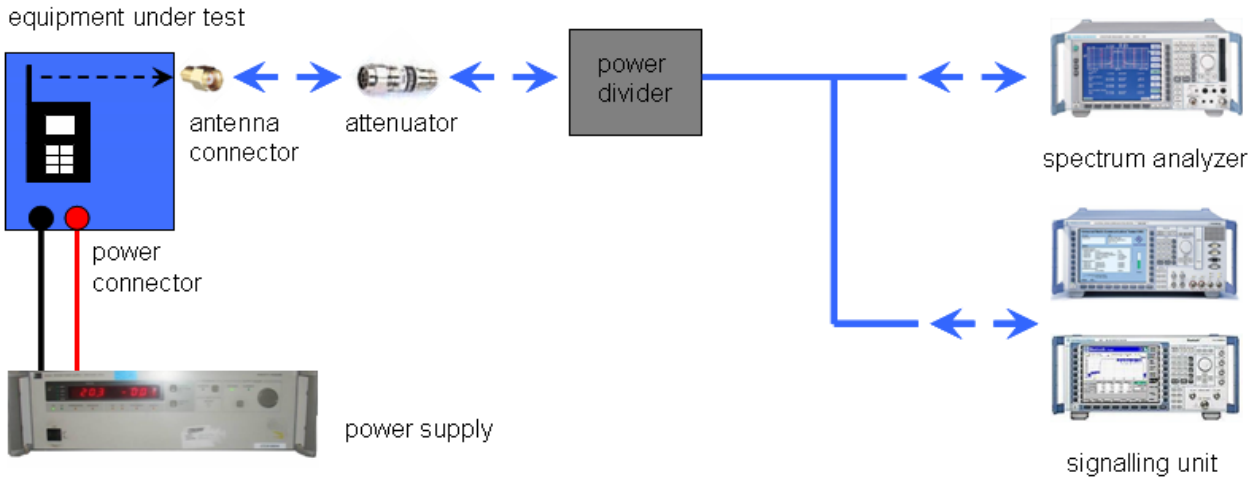
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents:

beyerdynamic

beyerdynamic GmbH & Co. KG, Postfach 1320, 74003 Heilbronn - Germany

Federal Communication Commission
Equipment Authorization Devision, Application Processing Branch
7435 Oakland Mills Road
Columbia, MD 21048

Certification and Engineering Bureau
Industry Canada
Spectrum Engineering Branch
3701 Carling Avenue, Building 94
Ottawa, Ontario K2H 8S2

March 11th, 2013

Declaration on Electrically Identical Models

TO WHOM IT MAY CONCERN

We, beyerdynamic GmbH & Co. KG, declare on our sole responsibility that the new model

Quinta MU 31

with FCC ID: *OSDQUINTAMU3X and IC: 3628A-QUINTAMU3X*

is identical in hardware and software to the certified model

Quinta MU 33 *under FCC ID: OSDQUINTAMU3X and IC: 3628A-QUINTAMU3X*

The only differences between the new models and the original model are:
Model Quinta MU 31 uses one button and model Quinta MU 33 three control buttons.

We attest that above changing are not relevant for any RF behaviour subject to regulatory items. Additional Spurious Emissions measurements on representative configurations have been performed to justify.

beyerdynamic GmbH & Co. KG
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74072 Heilbronn - Germany

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IBAN DE69 6205 0000 0000 0307 02
BIC HEISDE 66

Deutsche Bank AG Heilbronn
Sort Code 620 700 81 Acct. No. 0 186 304
IBAN DE88 6207 0081 0018 6304 00
BIC DEUTDE SS 620

Postbank Stuttgart
Sort Code 600 100 70 Acct. No. 70 685-703
IBAN DE53 6001 0070 0070 6857 03
BIC PBNKDEFF

Managing Director Wolfgang Luckhardt
Chairman of the Supervisory Board Prof. Wolf M. Nietzer, MBA LL.M.
Registered in Stuttgart HRA 101400
Venue Heilbronn
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ILN 40 10118 00000 3
Tax No. 65211/71002
WEEE-Reg. No. DE 76451448

beyerdynamic

Therefore all test reports remains applicable.

If you have any questions, please feel free to contact us at the address shown below

Sincerely,

Signature:

Contact Name: i.V. Ulrich Roth, Director of R&D
Address: Theresienstrasse 8
74072 Heilbronn
Germany
Telephone No: +49 7131 617 155
Fax No: +49 7131 617 215
Email: roth@beyerdynamic.de

Special test descriptions: None

Configuration descriptions: None

Test mode:

☐ No test mode available.
Iperf was used to ping another device with the largest support packet size

☒ Special software is used.
EUT is transmitting pseudo random data by itself

8.3 RSP100 test report cover sheet / performance test data

Test report number	:	**1-5623/12-01-08-C**			
Equipment model number:		**Quinta MU 31 and Quinta MU 33**			
Certification number	:	**3628A-QUINTAMU3X**			
Manufacturer (complete address)	:	**beyerdynamic GmbH & Co. KG Theresienstraße 8 74072 Heilbronn / GERMANY**			
Tested to radio standards specification no.	:	**RSS 210, Issue 8**			
Open area test site IC No.	:	**IC 3462C-1**			
Frequency range	:	**ISM band 5725 MHz to 5850 MHz**			
RF-power (max.)	:	**Conducted values:**			
		Band	**DSSS port A**	**DSSS port B**	**-/-**
		5736 – 5814 MHz, BPSK	**75.86 mW**	**71.45 mW**	
		5736 – 5814 MHz, QPSK	**142.23 mW**	**131.83 mW**	
		5755 – 5835 MHz			**-/-**
		Radiated values:			
		Band	**DSSS port A**	**DSSS port B**	**-/-**
		5736 – 5814 MHz, BPSK	**211.35 mW**	**208.93 mW**	
		5736 – 5814 MHz, QPSK	**413.05 mW**	**348.34 mW**	
		5755 – 5835 MHz			**-/-**
Occupied bandwidth (99%-BW)	:	**Band**	**DSSS port A**	**DSSS port B**	**-/-**
		5736 – 5814 MHz, BPSK	**16.15 MHz**	**16.29 MHz**	
		5736 – 5814 MHz, QPSK	**14.01 MHz**	**14.07 MHz**	
		5755 – 5835 MHz			**-/-**
Necessary bandwidth (calculated)	:	**Band**	**DSSS port A**	**DSSS port B**	**-/-**
		5736 – 5814 MHz, BPSK	**16.88 MHz**	**16.88 MHz**	
		5736 – 5814 MHz, QPSK	**16.88 MHz**	**16.88 MHz**	
		5755 – 5835 MHz			**-/-**
Emission classification	:	**(according TRC-43)**	**G1D**		
Type of modulation	:	**DSSS technology with BPSK and QPSK modulation.**			
Antenna information	:	**2 integrated antennas**			
Transmitter spurious [dBµV/m @ 3m]	:	**40.92 @ 5.33 GHz (peak)**			

ATTESTATION:
DECLARATION OF COMPLIANCE:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory manager:

2013-10-29	Tobias Wittenmeier	cn=Tobias Wittenmeier, o=CETECOM ICT Services GmbH, ou=WIT-111222, email=tobias.wittenmeier@cetecom.com, c=DE 2013.10.29 08:00:31 +01'00'
Date	Name	Signature

9 Measurement results

9.1 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the DSSS mode is used.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	3 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
Antenna Gain	
6 dBi	

Results: DSSS, antenna port A

T_{nom}	V_{nom}	lowest channel 5736 MHz	middle channel 5762 MHz	highest channel 5814 MHz
Conducted power [dBm]		16.82	16.63	15.91
Radiated power [dBm]		21.13	21.26	20.56
Gain [dBi] Calculated		+4.31	+4.63	+4.65
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)		

Result: Passed

Results: DSSS, antenna port B

T_{nom}	V_{nom}	lowest channel 5736 MHz	middle channel 5762 MHz	highest channel 5814 MHz
Conducted power [dBm]		16.54	15.91	15.48
Radiated power [dBm]		21.20	20.42	19.70
Gain [dBi] Calculated		+4.66	+4.51	+4.22
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)		

Result: Passed

9.2 Maximum output power

Description:

Measurement of the maximum output power conducted and radiated. The measurements are performed using the data rate producing the highest conducted output power. The determination of these data rates was performed at the beginning of the tests.

Measurement:

Measurement parameter	
According to DTS clause 9.1.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	40 MHz
Integration bandwidth:	75 % power - bandwidth (DTS BW)
Trace-Mode:	Max hold (allow trace to fully stabilize)
Measurement function:	Channel power with DTS BW

Limits:

FCC	IC
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Results: DSSS, antenna port A, BPSK

DSSS	Maximum Output Power [dBm]		
Frequency	5736 MHz	5762 MHz	5814 MHz
Peak output power conducted	18.80	18.62	17.72
Output Power Radiated – EIRP*) Worst case	23.11	23.25	22.37
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

Results: DSSS, antenna port B, BPSK

DSSS	Maximum Output Power [dBm]		
Frequency	5736 MHz	5762 MHz	5814 MHz
Peak output power conducted	18.54	18.28	17.67
Output Power Radiated – EIRP*) Worst case	23.20	22.79	21.89
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

Results: DSSS, antenna port A, QPSK

DSSS	Maximum Output Power [dBm]		
Frequency	5736 MHz	5762 MHz	5814 MHz
Peak output power conducted	21.37	21.53	21.22
Output Power Radiated – EIRP*) Worst case	25.68	26.16	25.87
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

Results: DSSS, antenna port B, QPSK

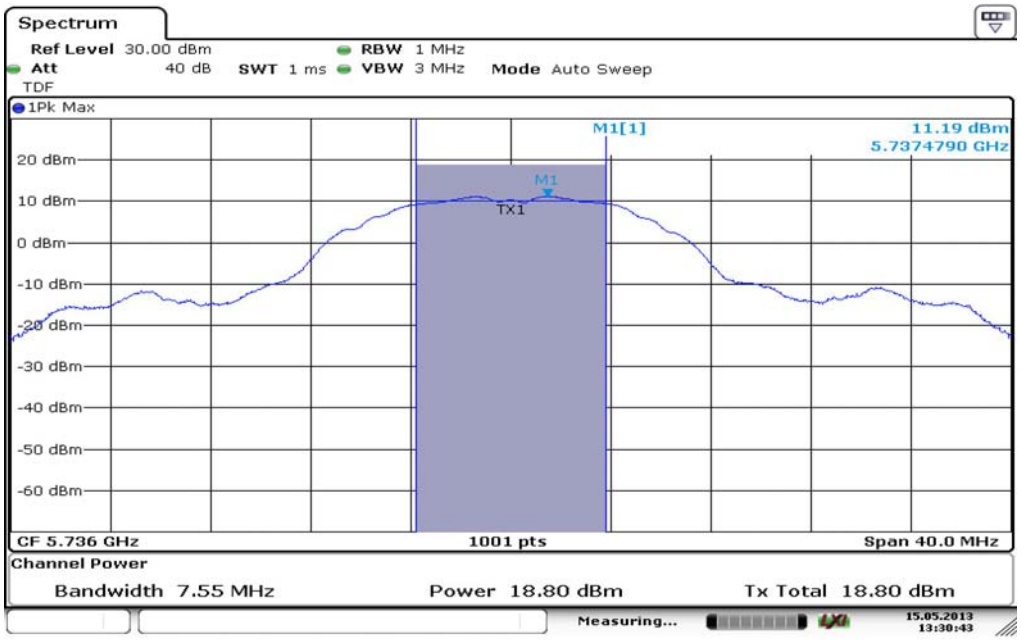
DSSS	Maximum Output Power [dBm]		
Frequency	5736 MHz	5762 MHz	5814 MHz
Peak output power conducted	20.06	20.53	21.20
Output Power Radiated – EIRP*) Worst case	24.72	25.04	25.42
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

Plots: DSSS, antenna port A, BPSK

Plot 1: TX mode, lowest channel



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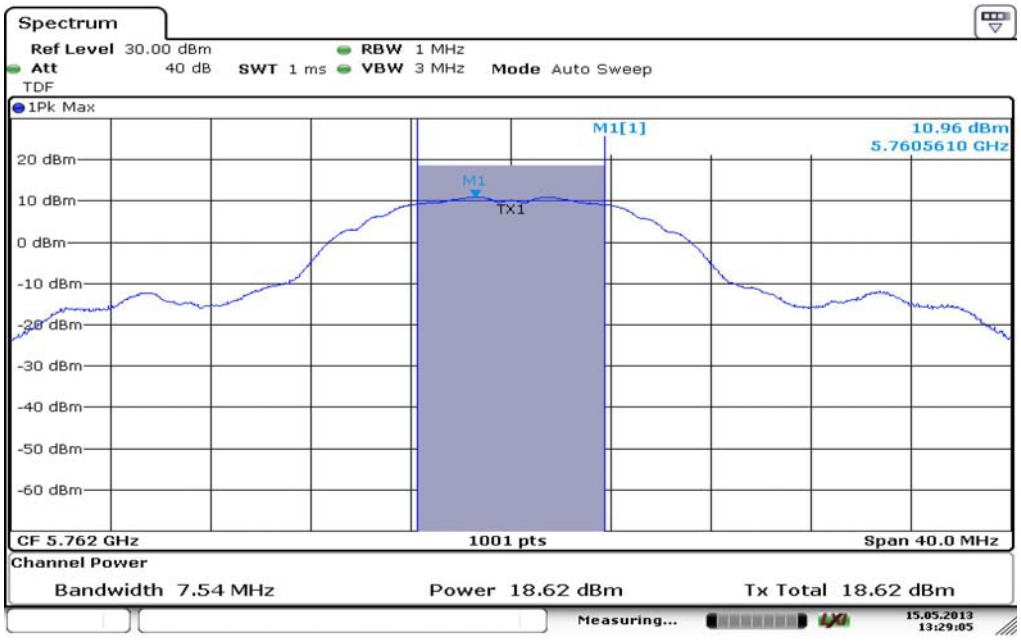
Plot 2: TX mode, middle channel



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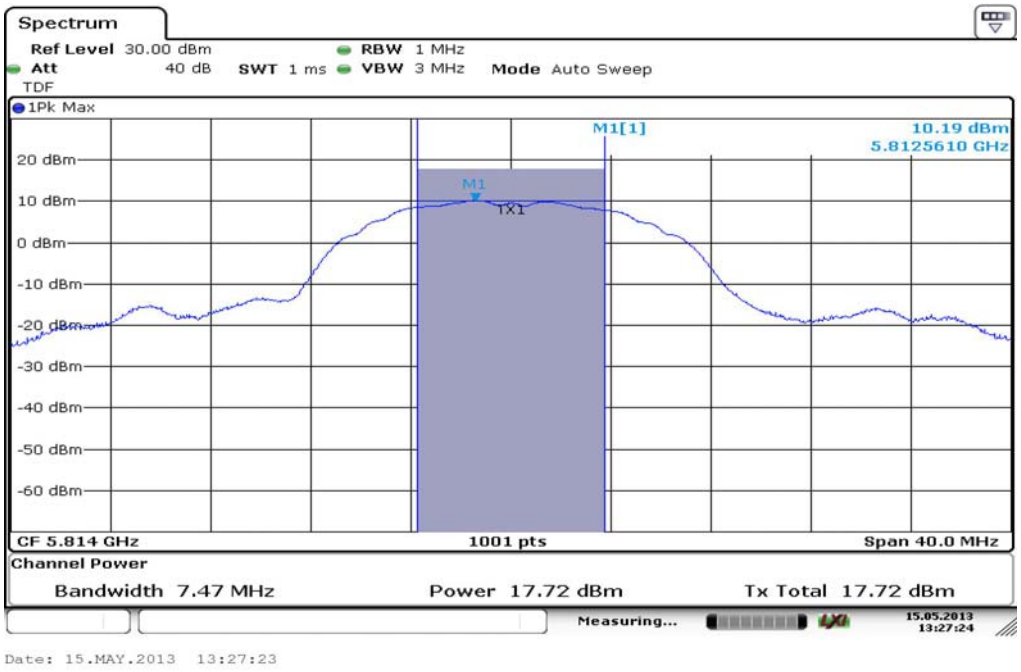
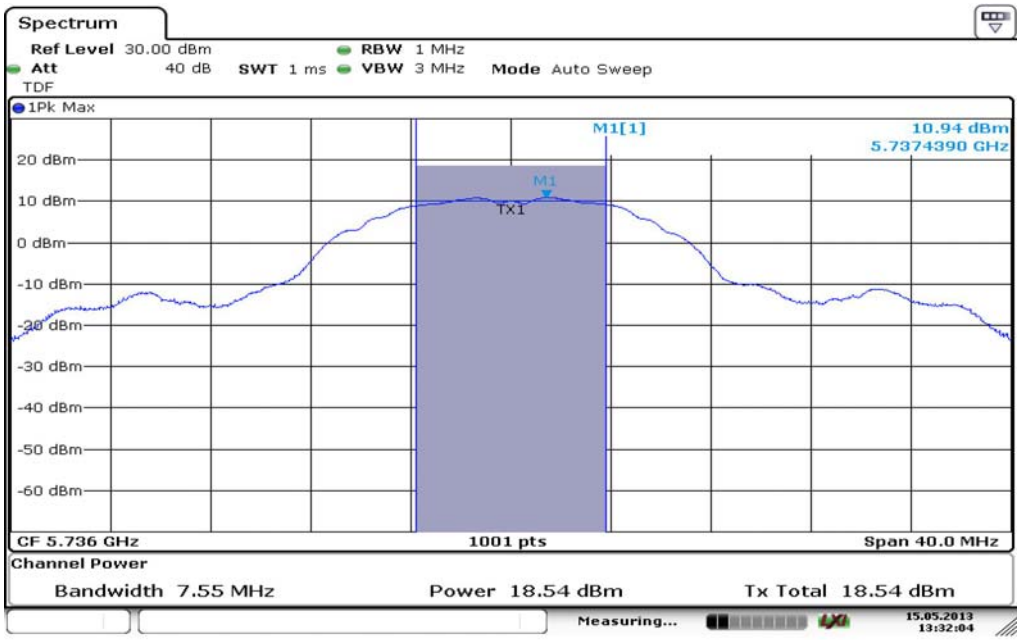
Plot 3: TX mode, highest channel



Plots: DSSS, antenna port B, BPSK

Plot 1: TX mode, lowest channel



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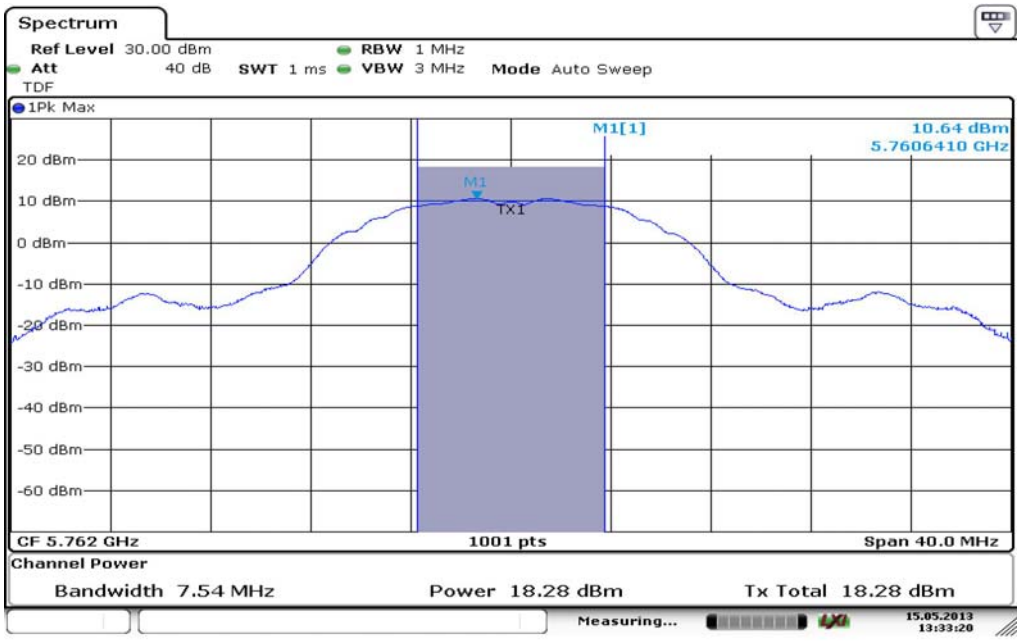

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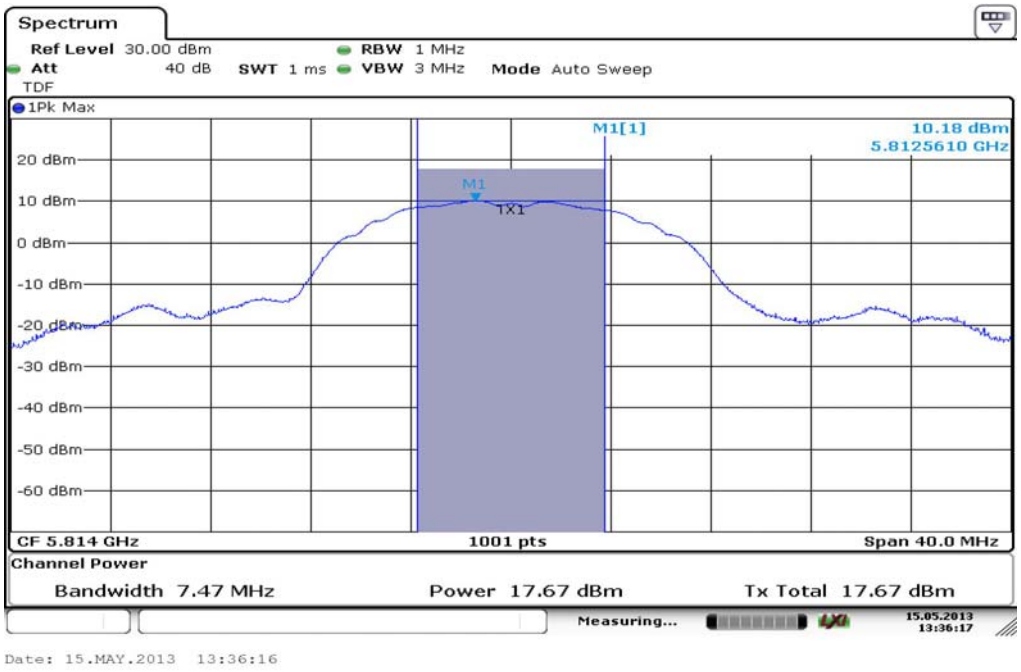
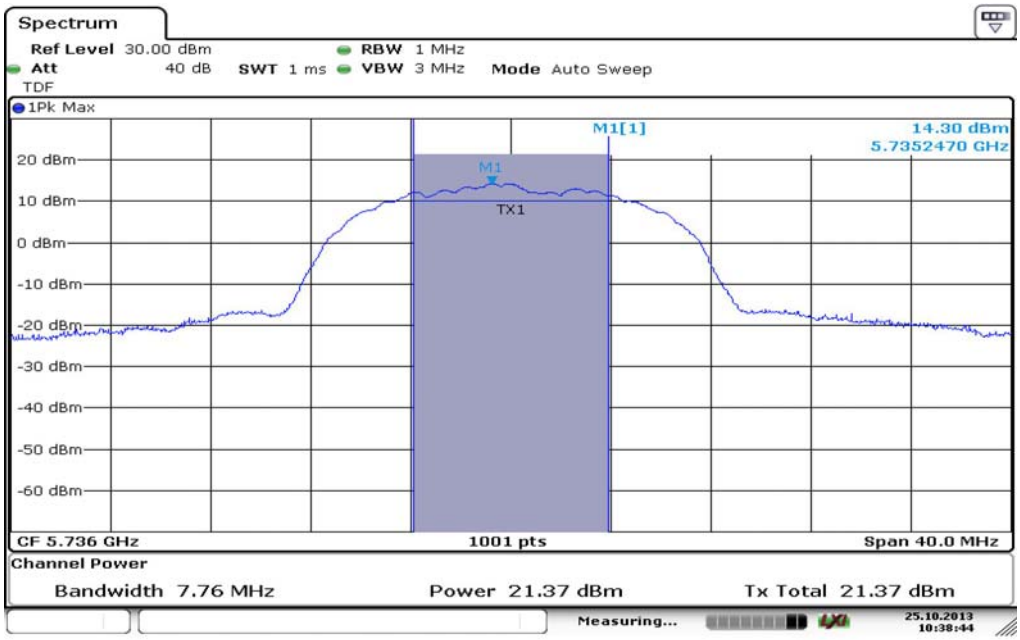
Plot 3: TX mode, highest channel



Plots: DSSS, antenna port A, QPSK

Plot 1: TX mode, lowest channel



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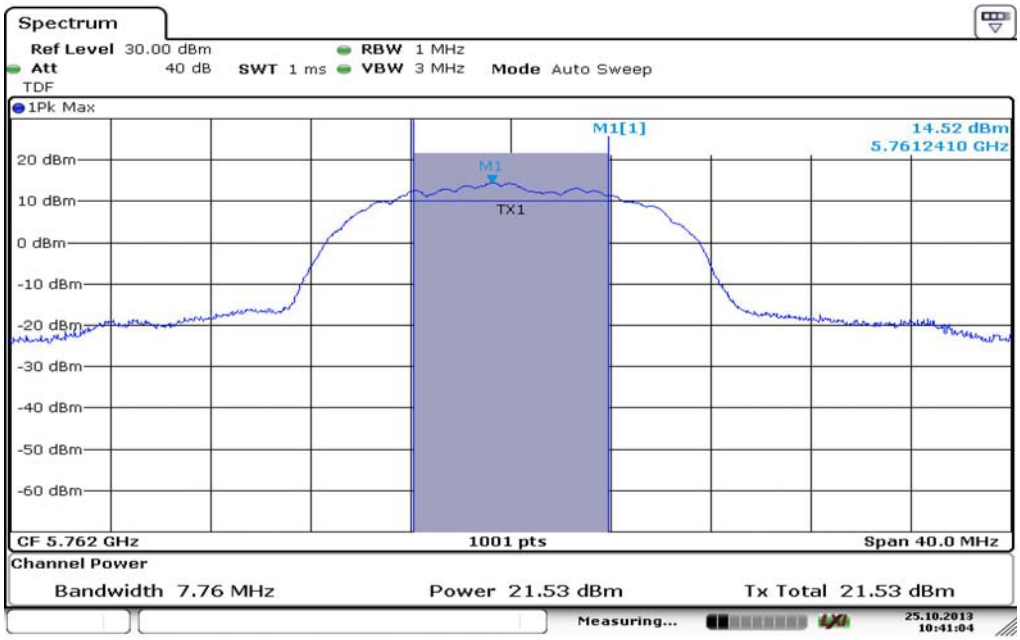

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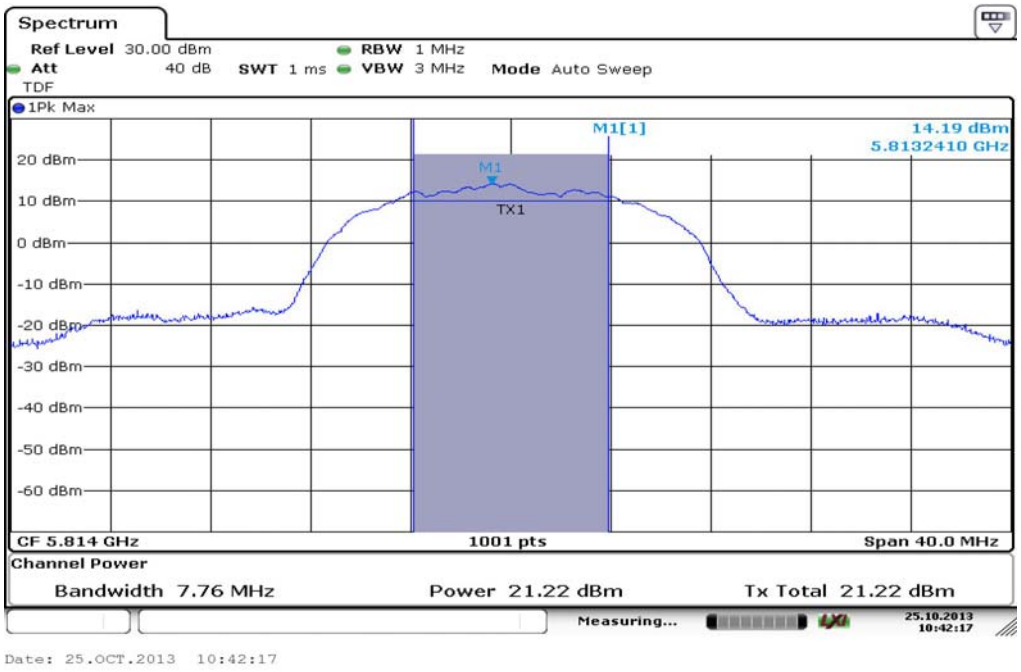
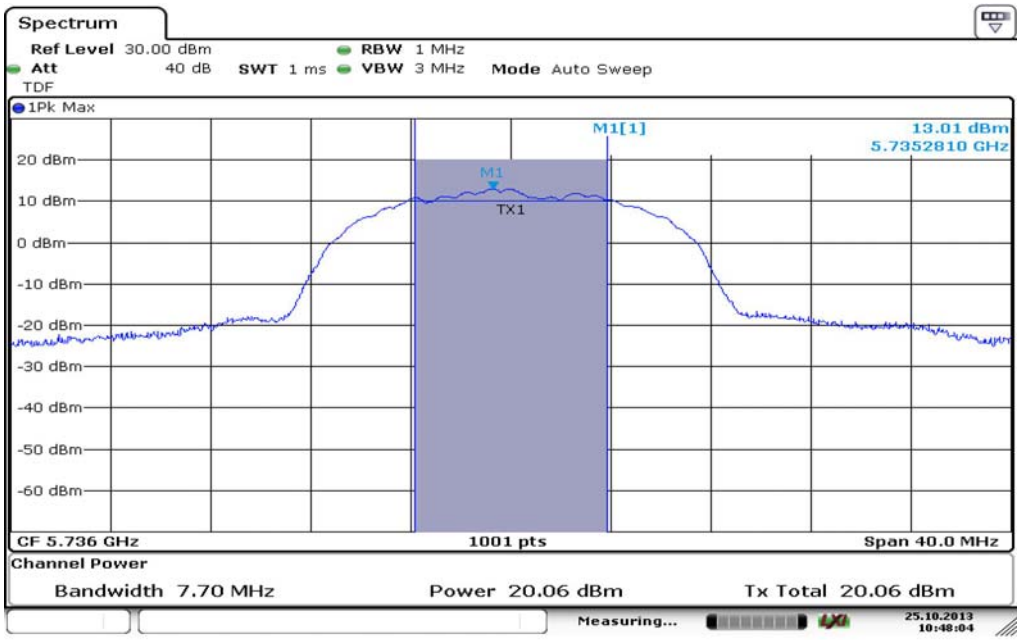
Plot 3: TX mode, highest channel



Plots: DSSS, antenna port B, QPSK

Plot 1: TX mode, lowest channel



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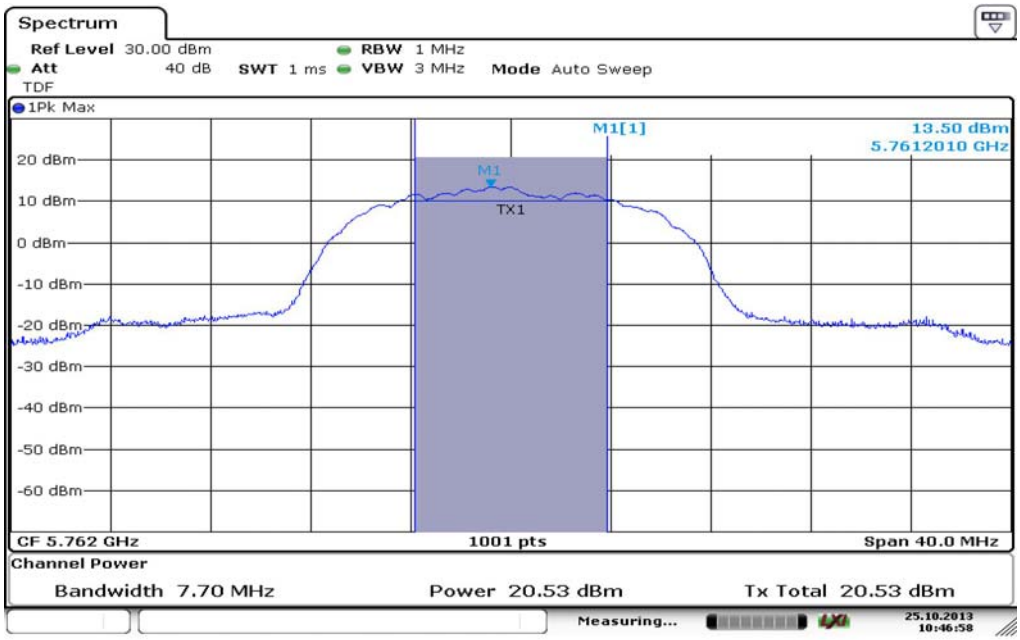
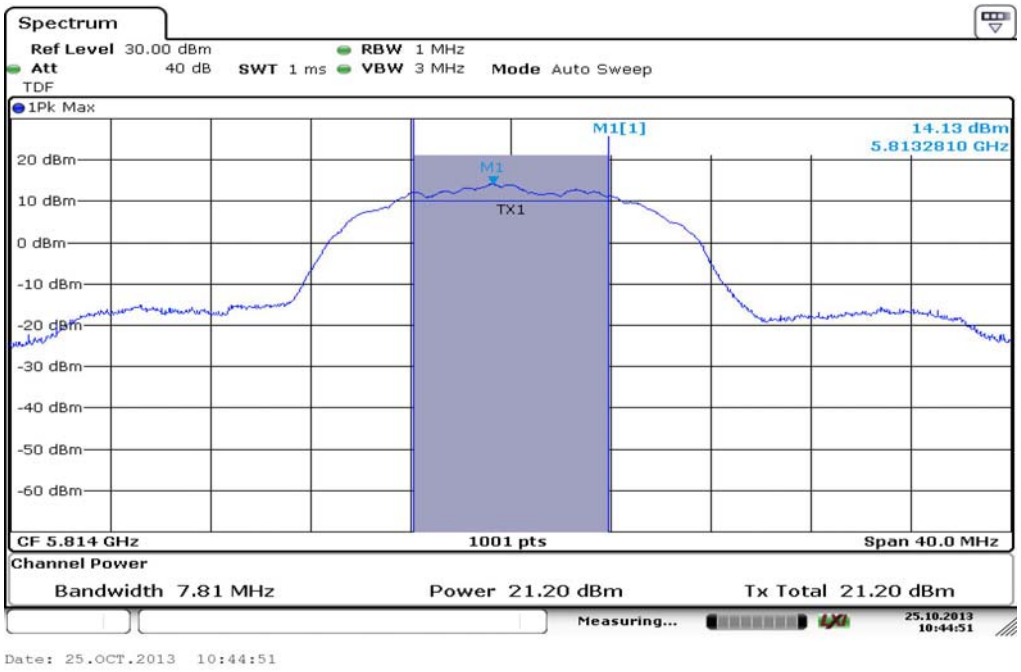


Date: 25.OCT.2013 10:46:58

Plot 3: TX mode, highest channel



9.3 Power spectral density

Description:

Measurement of the power spectral density of a digital modulated system. The measurement is repeated for both modulations at the lowest, middle and highest channel.

Measurement:

Measurement parameter	
According to DTS clause 10.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 kHz
Video bandwidth:	10 kHz
Span:	40 MHz
Trace-Mode:	Max hold (allow trace to fully stabilize)

Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

Results:

Modulation	Power Spectral density [dBm]		
Frequency	5736 MHz	5762 MHz	5814 MHz
DSSS, antenna port A, BPSK	0.42	0.27	-0.48
DSSS, antenna port A, QPSK	-10.38	-9.97	-10.52
DSSS, antenna port B, BPSK	0.13	0.04	-0.44
DSSS, antenna port B, QPSK	-11.66	-10.97	-10.52
Measurement uncertainty	± 1.5 dB		

Result: Passed

9.4 Spectrum bandwidth – 6 dB emission bandwidth

Description:

Measurement of the 75 % bandwidth of the modulated signal.

Measurement:

Measurement parameter	
According to DTS clause 8.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	40 MHz
Measurement procedure:	Measurement of the 75% bandwidth using the integration function of the analyzer
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

FCC	IC
Spectrum Bandwidth – 75 %	
Systems using digital modulation techniques may operate in the 5725–5850 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

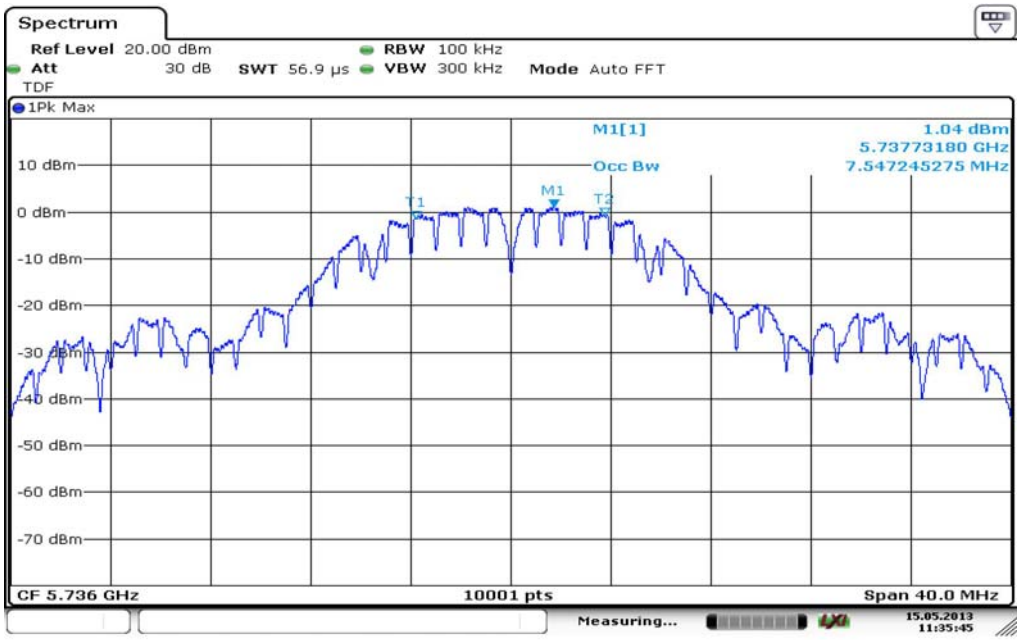
Results:

Modulation	75 % bandwidth [MHz]		
Frequency	5736 MHz	5762 MHz	5814 MHz
DSSS, antenna port A, BPSK	7.55	7.54	7.47
DSSS, antenna port A, QPSK	7.76	7.76	7.76
DSSS, antenna port B, BPSK	7.55	7.54	7.47
DSSS, antenna port B, QPSK	7.70	7.70	7.81
Measurement uncertainty	± RBW		

Result: Passed

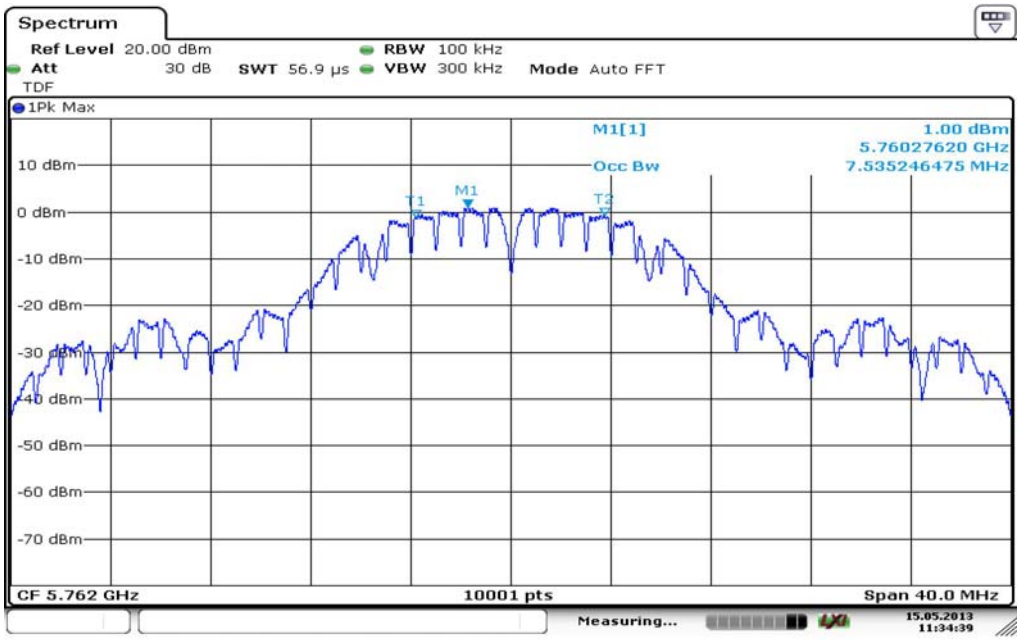
Plots: DSSS, antenna port A, BPSK

Plot 1: TX mode, lowest channel



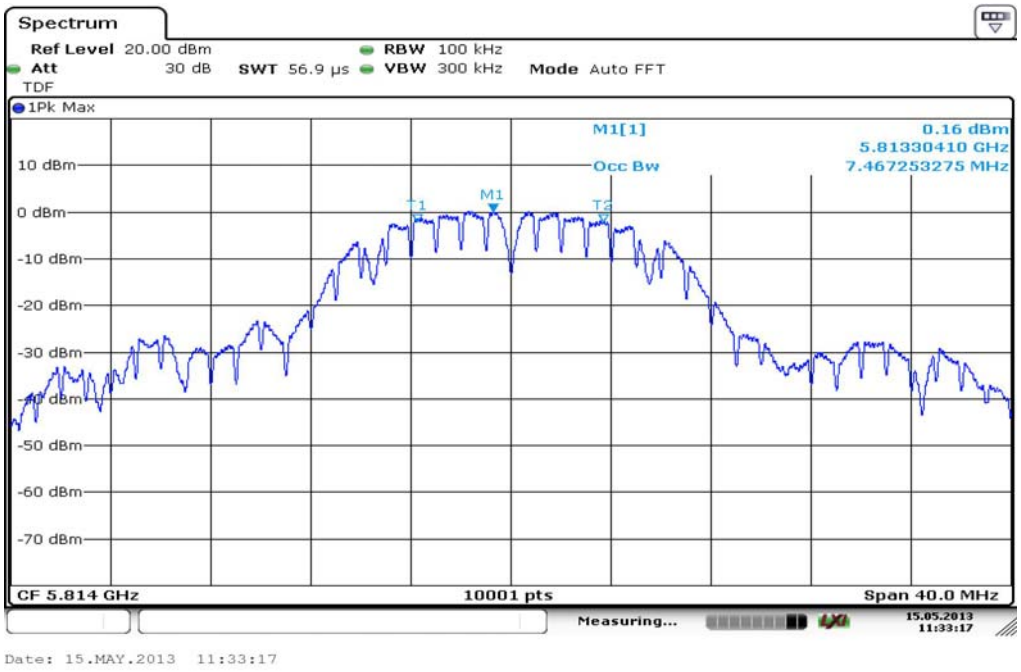
Date: 15.MAY.2013 11:35:44

Plot 2: TX mode, middle channel



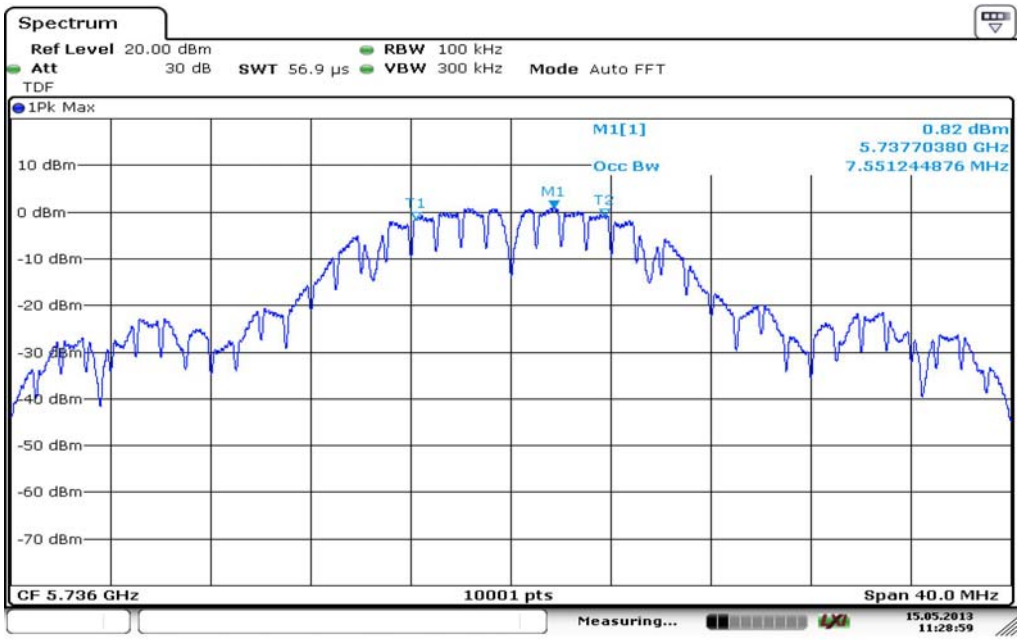
Date: 15.MAY.2013 11:34:39

Plot 3: TX mode, highest channel



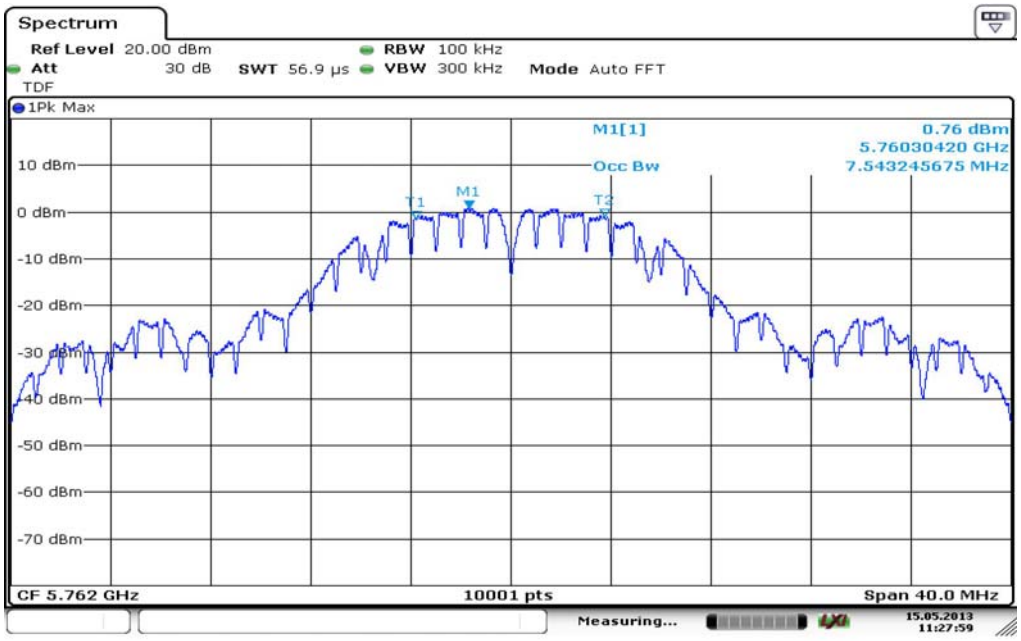
Plots: DSSS, antenna port B, BPSK

Plot 1: TX mode, lowest channel



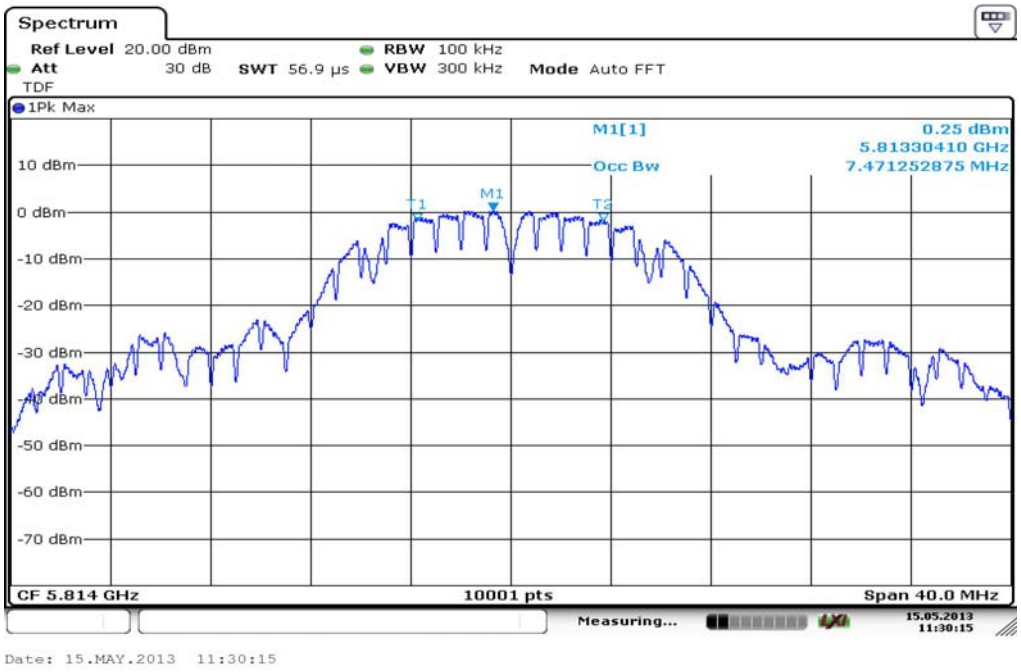
Date: 15.MAY.2013 11:28:59

Plot 2: TX mode, middle channel



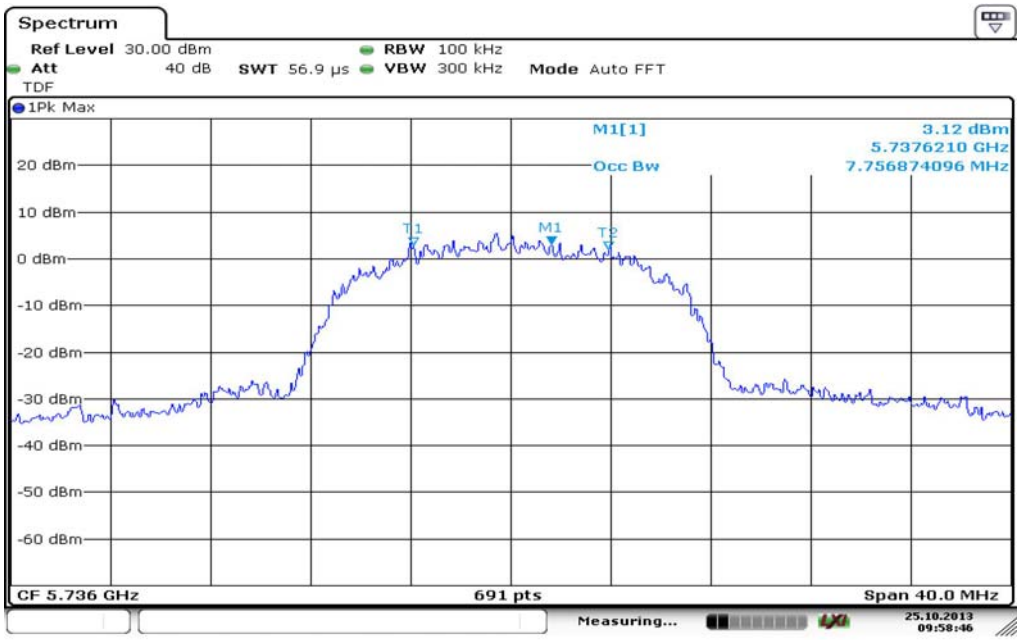
Date: 15.MAY.2013 11:27:59

Plot 3: TX mode, highest channel



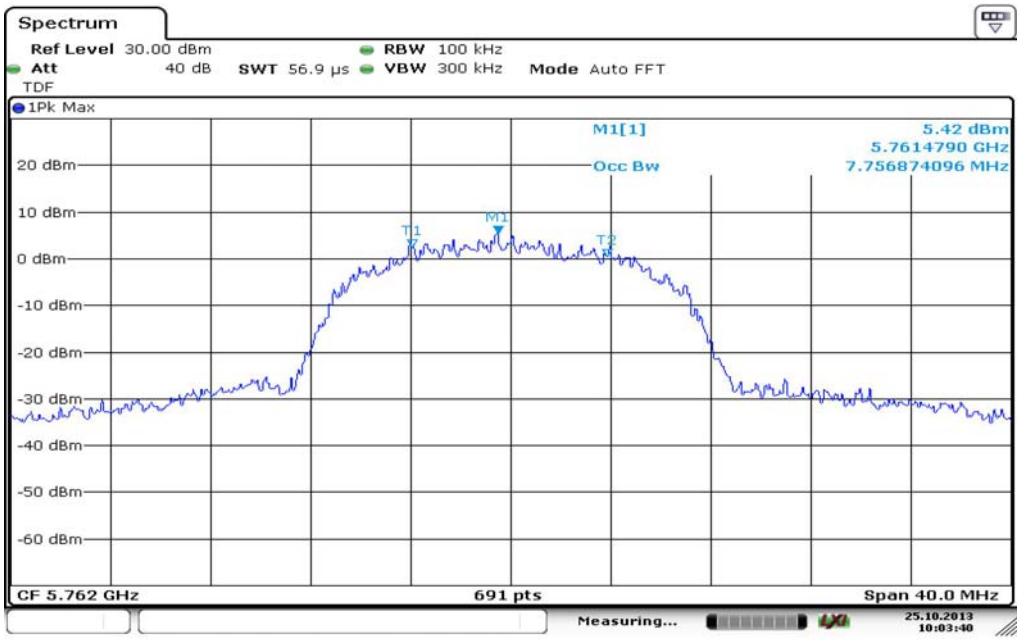
Plots: DSSS, antenna port A, QPSK

Plot 1: TX mode, lowest channel



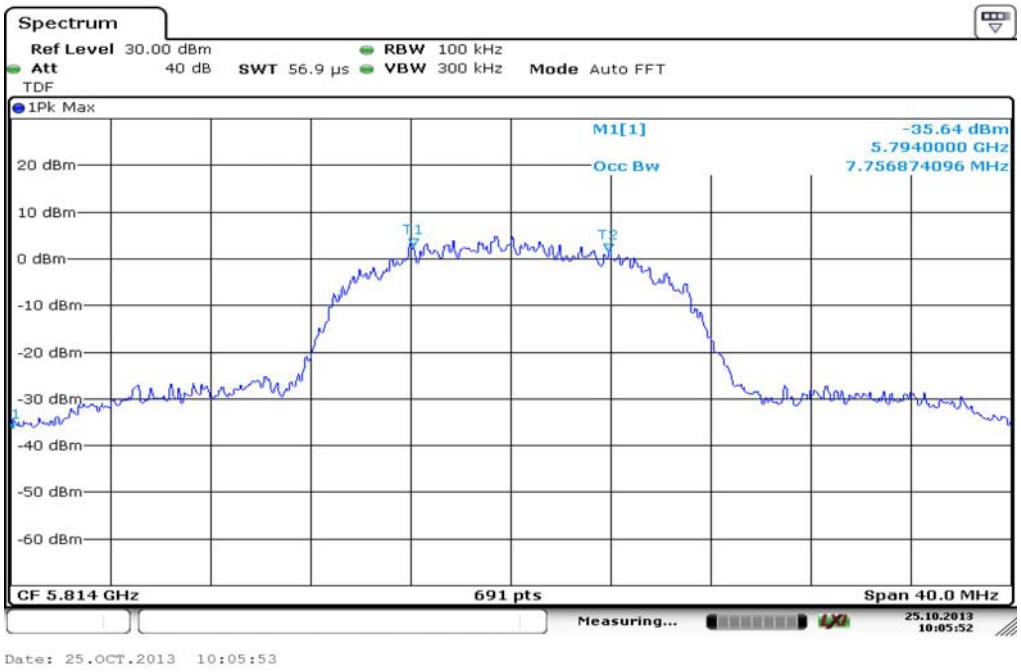
Date: 25.OCT.2013 09:58:46

Plot 2: TX mode, middle channel



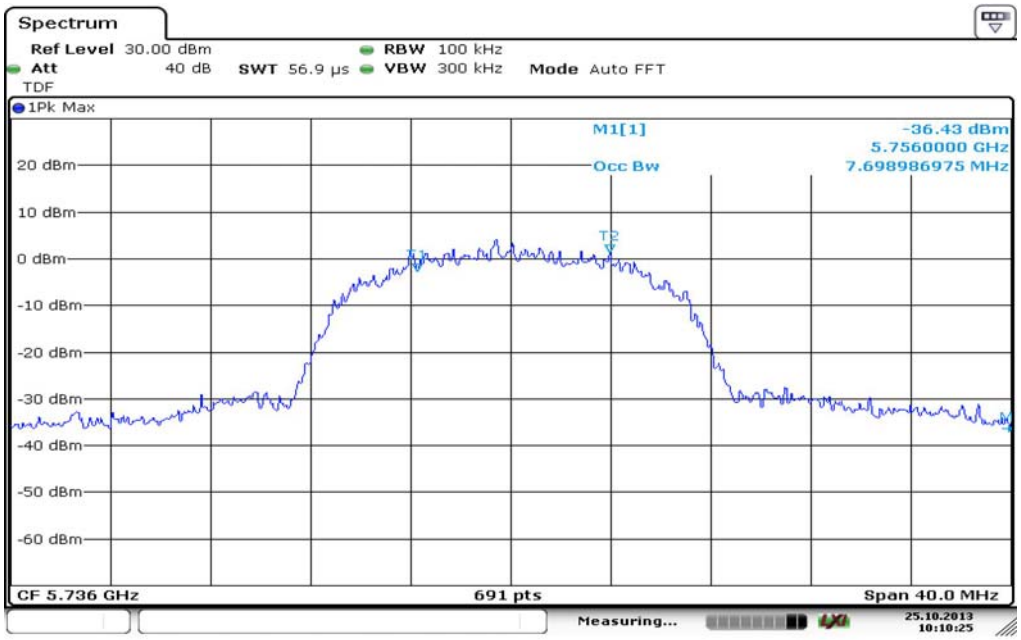
Date: 25.OCT.2013 10:03:40

Plot 3: TX mode, highest channel



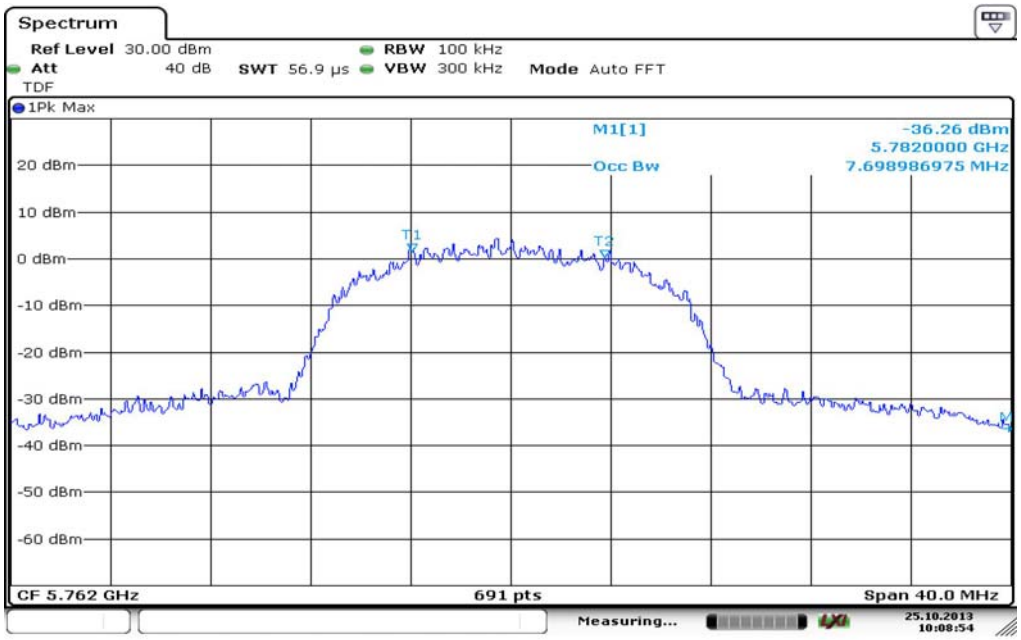
Plots: DSSS, antenna port B, QPSK

Plot 1: TX mode, lowest channel



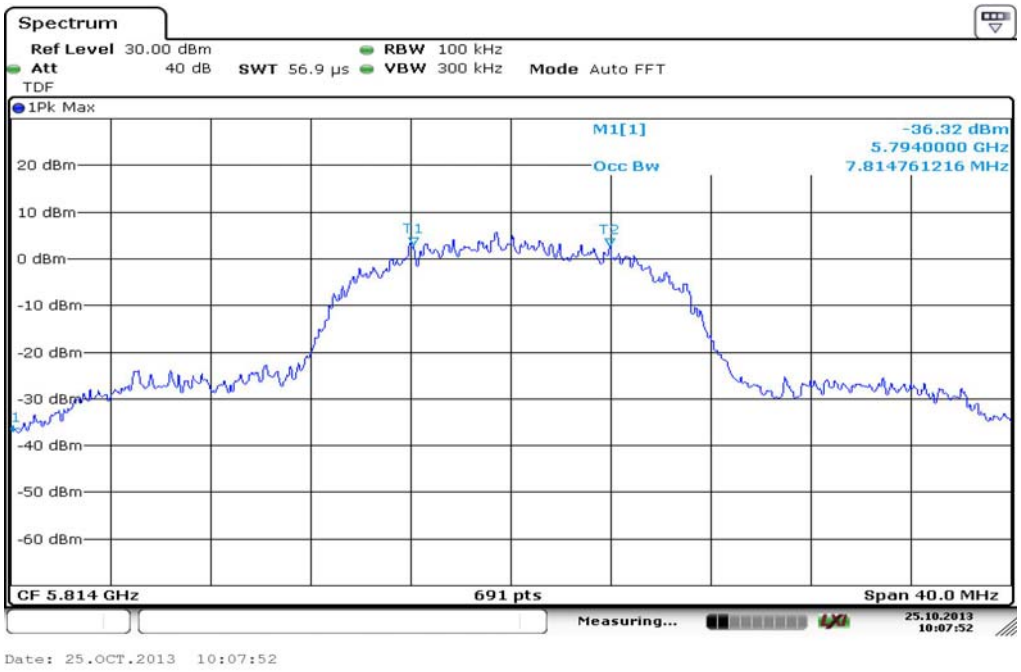
Date: 25.OCT.2013 10:10:25

Plot 2: TX mode, middle channel



Date: 25.OCT.2013 10:08:54

Plot 3: TX mode, highest channel



9.5 Spectrum bandwidth – 99% emission bandwidth

Description:

Measurement of the 99% bandwidth of the modulated signal acc. RSS-GEN.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	500 kHz
Video bandwidth:	3 MHz
Span:	40 MHz
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

-/-	IC
Occupied Bandwidth – 99% emission bandwidth	
OBW is neccessary for Emission Designator	

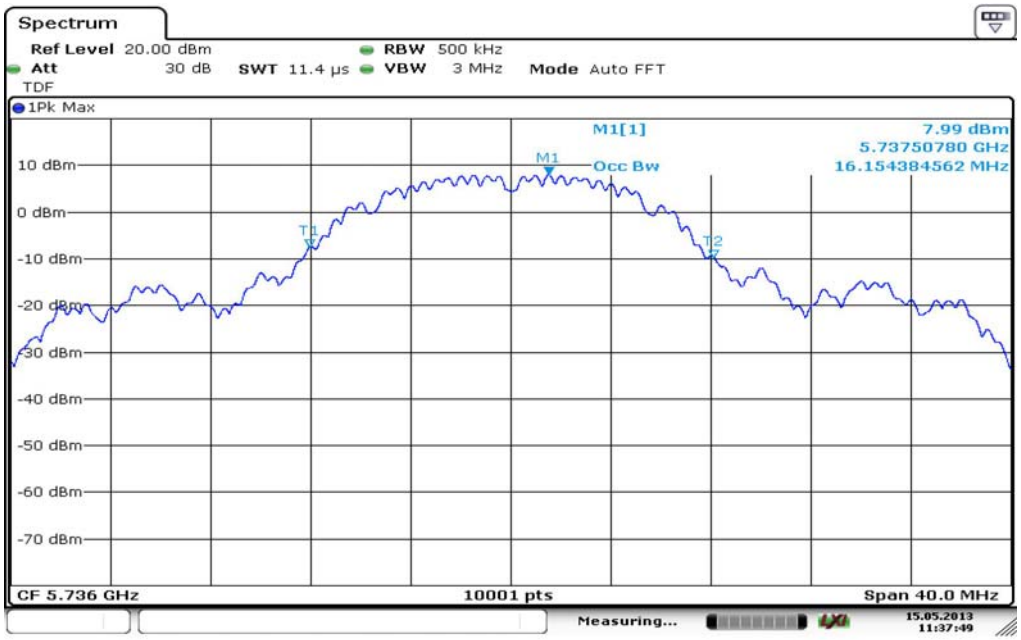
Results:

Modulation	99 % bandwidth [MHz]		
Frequency	5736 MHz	5762 MHz	5814 MHz
DSSS, antenna port A, BPSK	16.15	15.51	14.42
DSSS, antenna port A, QPSK	13.95	13.95	14.01
DSSS, antenna port B, BPSK	16.29	15.72	14.44
DSSS, antenna port B, QPSK	13.95	13.95	14.07
Measurement uncertainty	± RBW		

Result: Passed

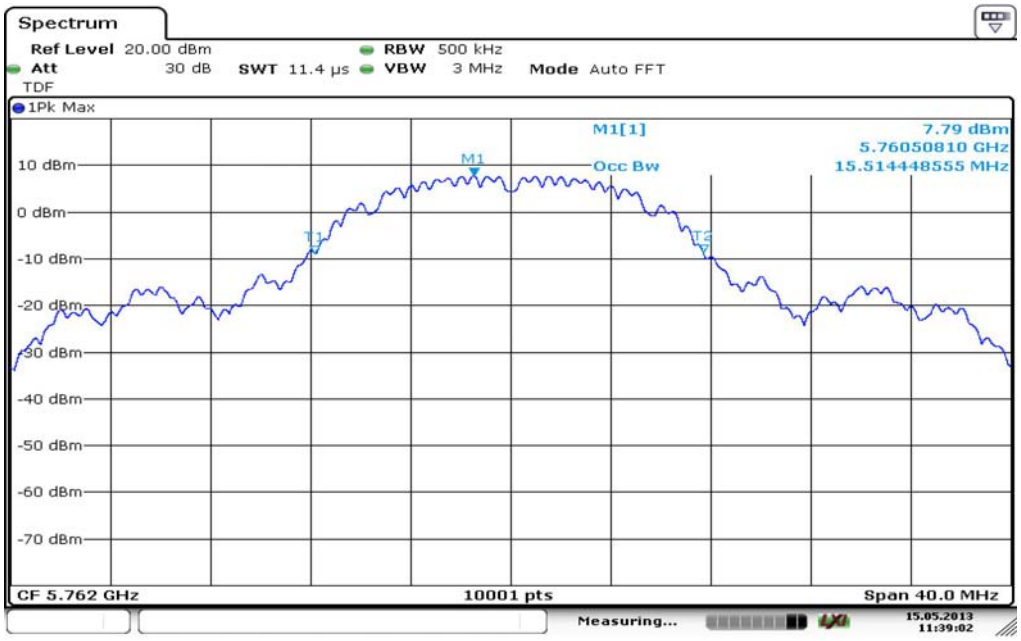
Plots: DSSS, antenna port A, BPSK

Plot 1: TX mode, lowest channel



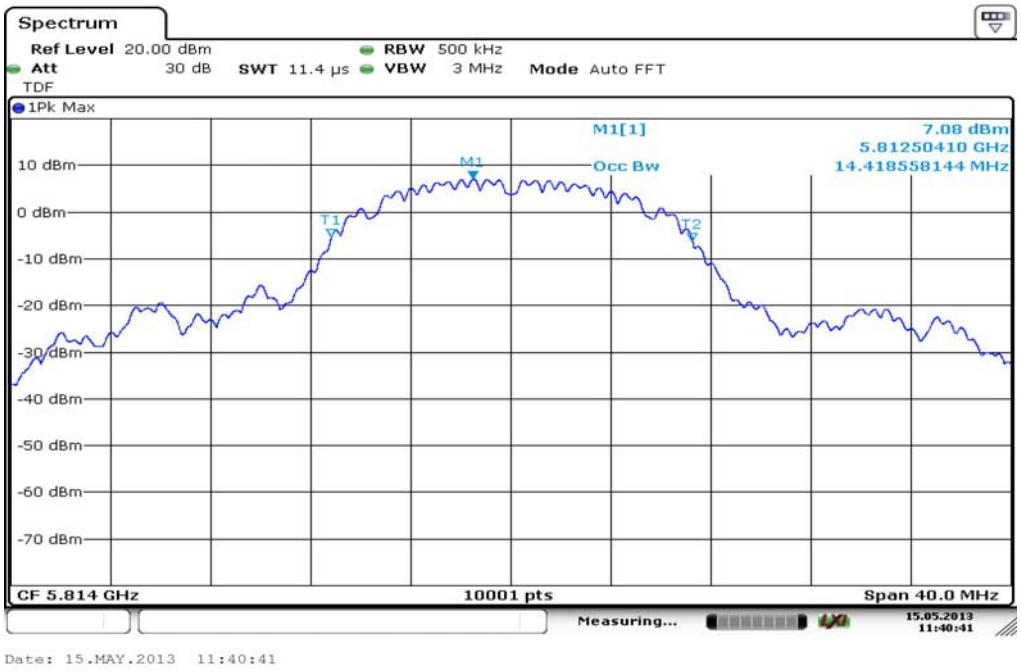
Date: 15.MAY.2013 11:37:49

Plot 2: TX mode, middle channel



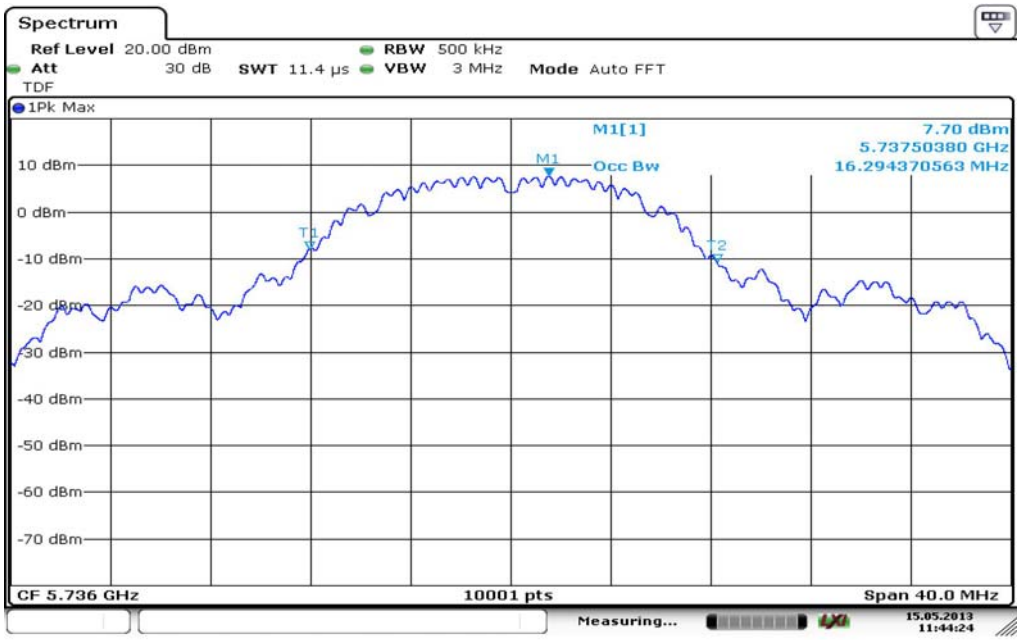
Date: 15.MAY.2013 11:39:02

Plot 3: TX mode, highest channel



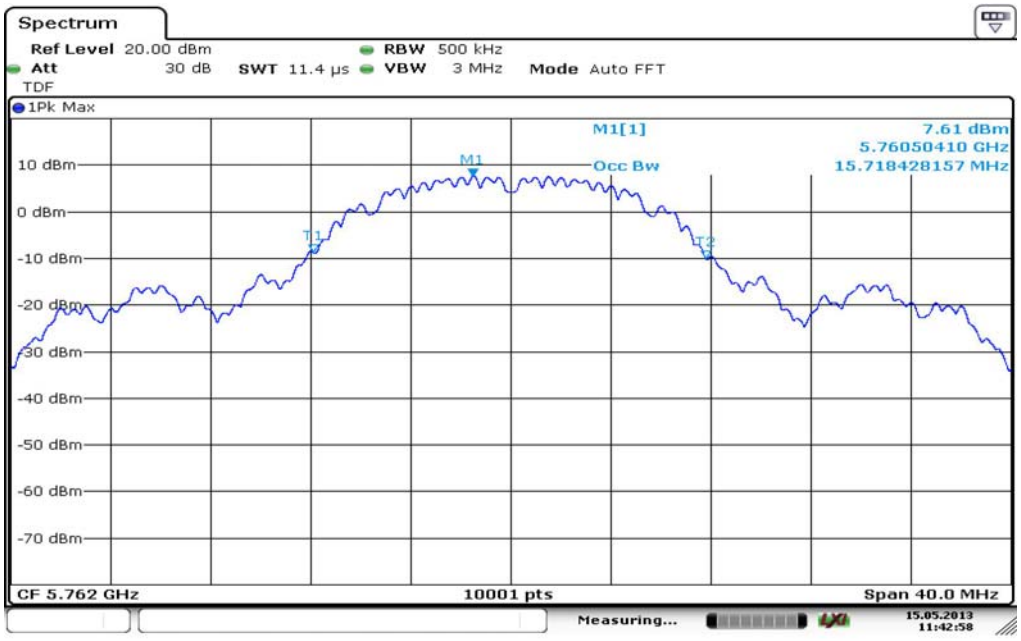
Plots: DSSS, antenna port B, BPSK

Plot 1: TX mode, lowest channel



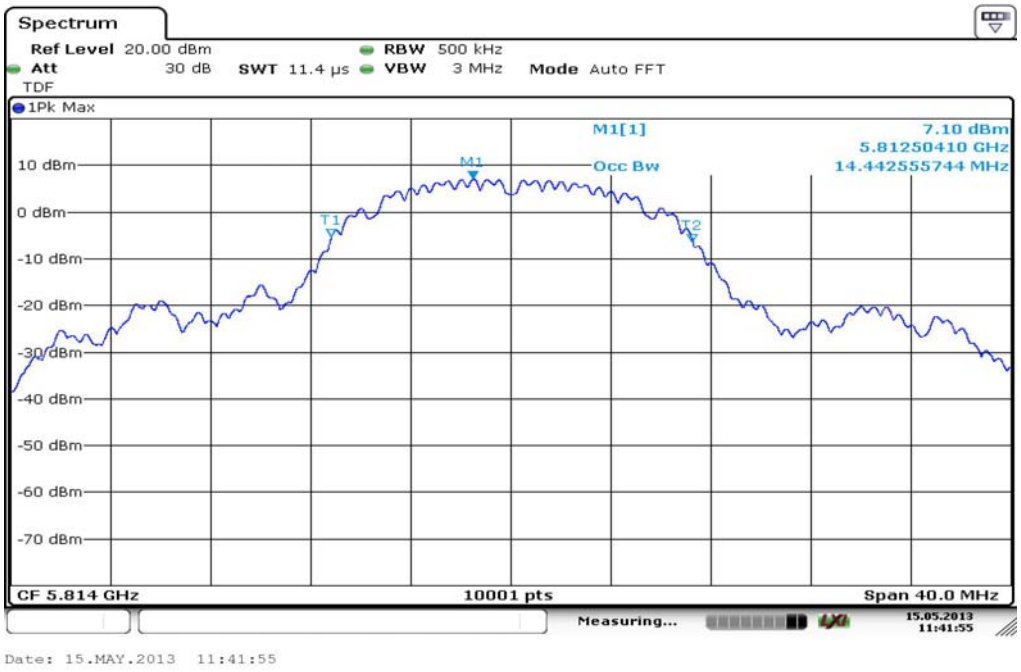
Date: 15.MAY.2013 11:44:24

Plot 2: TX mode, middle channel



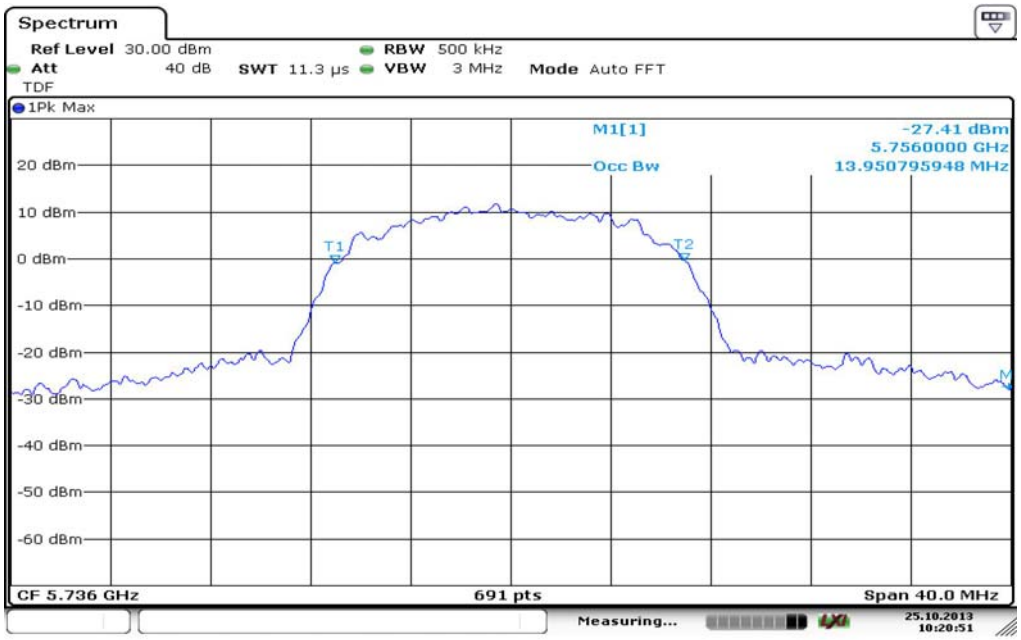
Date: 15.MAY.2013 11:42:58

Plot 3: TX mode, highest channel



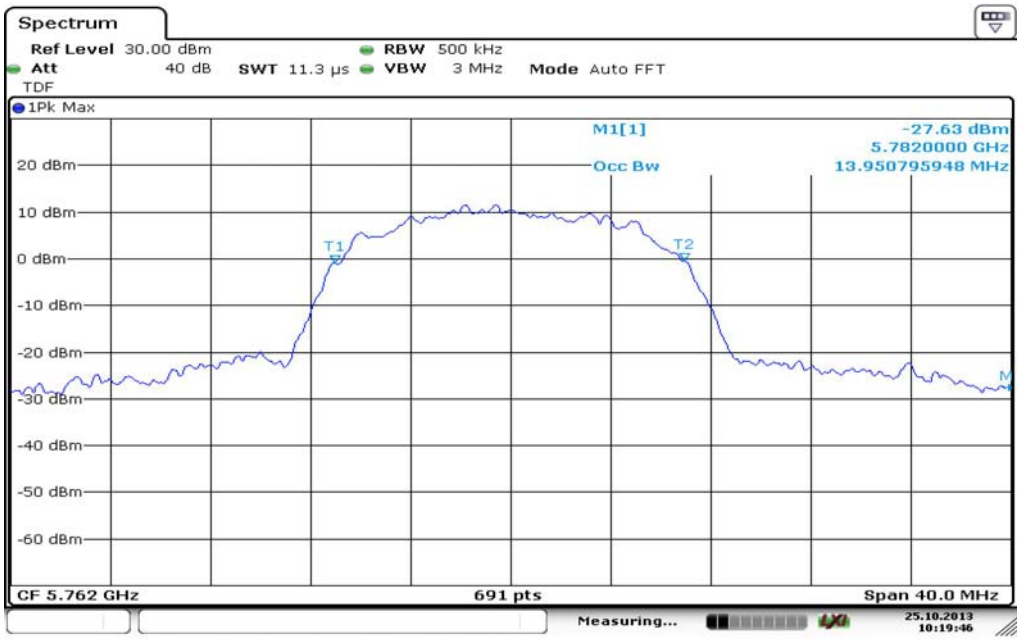
Plots: DSSS, antenna port A, BPSK

Plot 1: TX mode, lowest channel



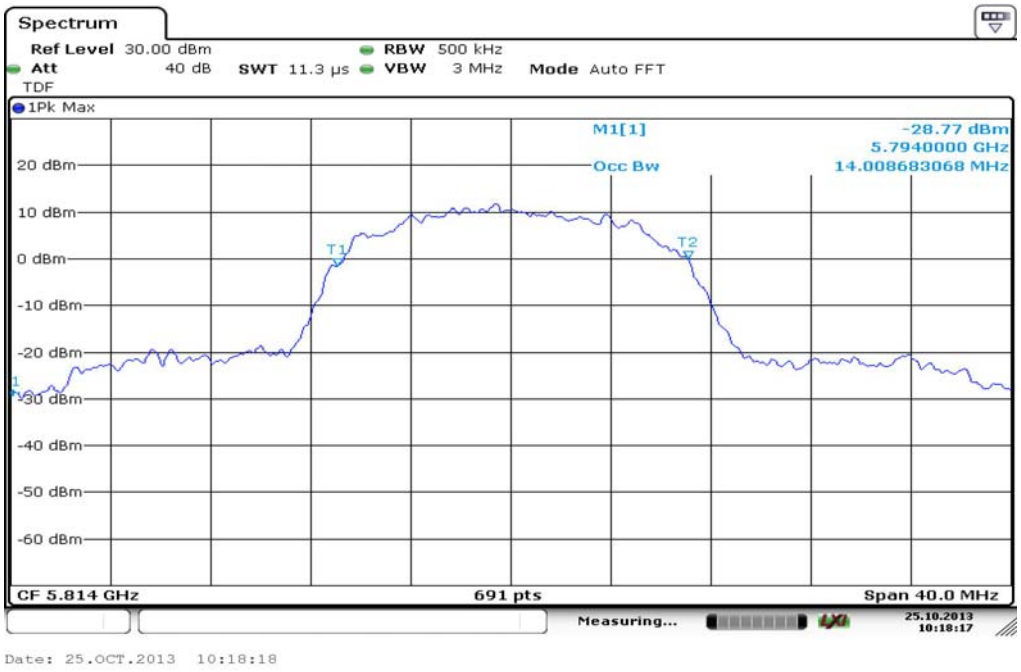
Date: 25.OCT.2013 10:20:51

Plot 2: TX mode, middle channel



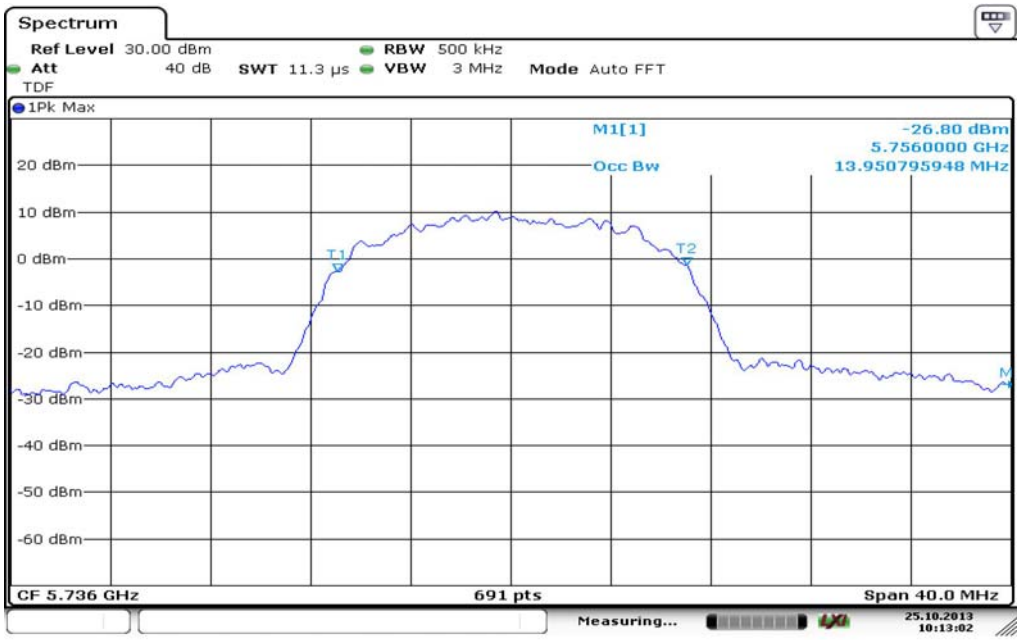
Date: 25.OCT.2013 10:19:46

Plot 3: TX mode, highest channel



Plots: DSSS, antenna port B, BPSK

Plot 1: TX mode, lowest channel

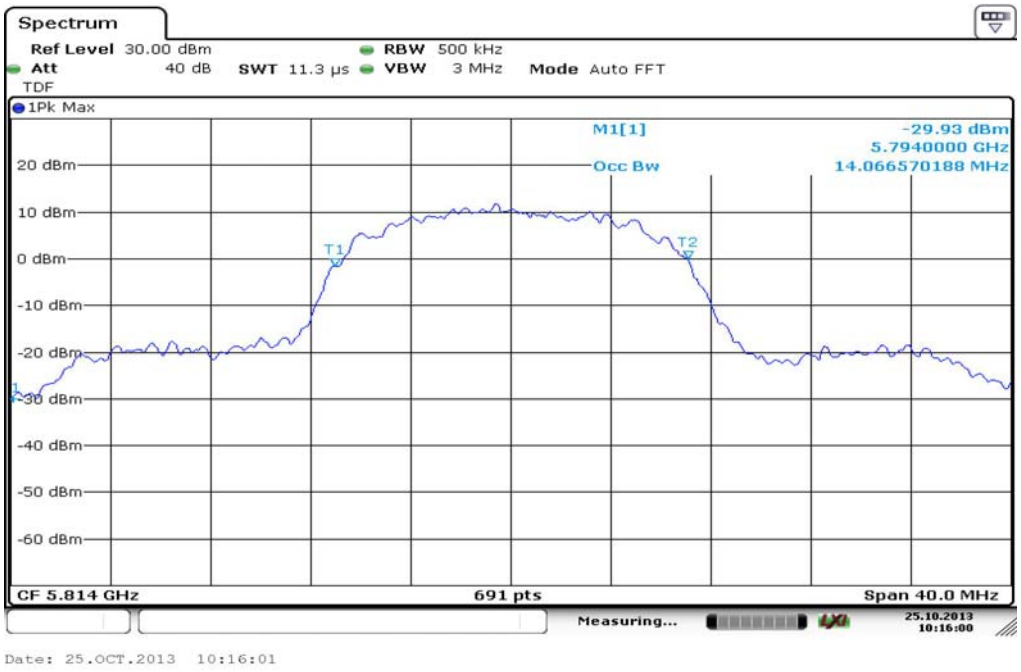


Date: 25.OCT.2013 10:13:02

Plot 2: TX mode, middle channel

Date: 25.OCT.2013 10:14:43

Plot 3: TX mode, highest channel



9.6 Band edge compliance conducted

Description:

Measurement of the conducted band edge compliance. EUT is measured at the lower and upper band edge in both modes.

Measurement:

Measurement parameter	
According to DTS clause 13.2.1	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	Lower Band Edge: 5625 – 5750 MHz Upper Band Edge: 5800 – 5950 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
Band Edge Compliance Conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.	

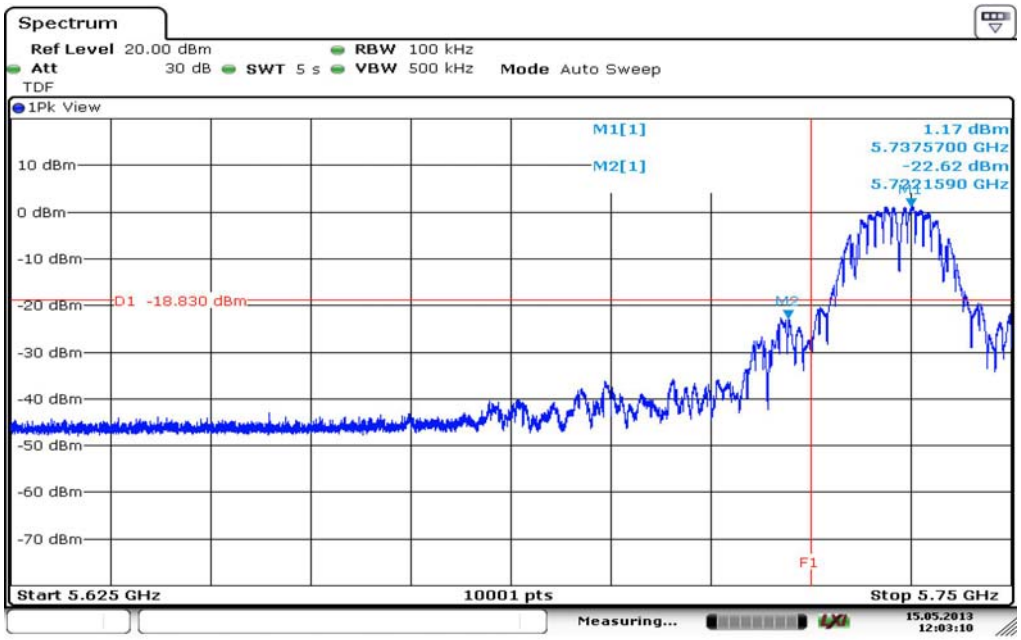
Results:

Scenario	Band Edge Compliance Conducted [dB]	
Modulation	DSSS, antenna port A	DSSS, antenna port B
Lower Band Edge, BPSK	> 20 dB	> 20 dB
Lower Band Edge, QPSK	> 20 dB	> 20 dB
Upper Band Edge, BPSK	> 20 dB	> 20 dB
Lower Band Edge, QPSK	> 20 dB	> 20 dB
Measurement uncertainty	± 1.5 dB	

Result: Passed

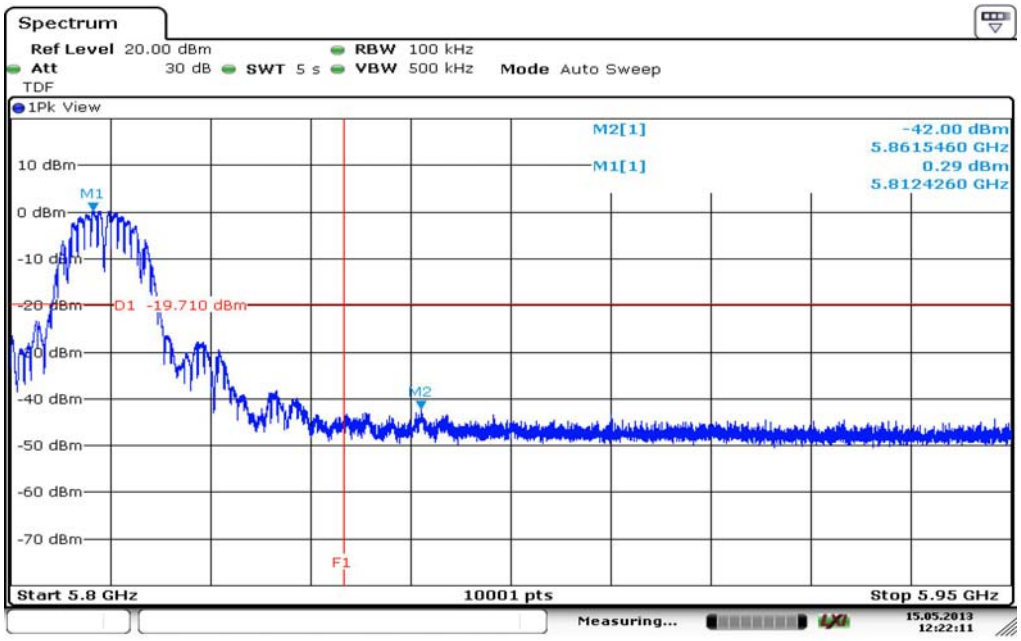
Plots: DSSS, antenna port A, BPSK

Plot 1: lower band edge



Date: 15.MAY.2013 12:03:10

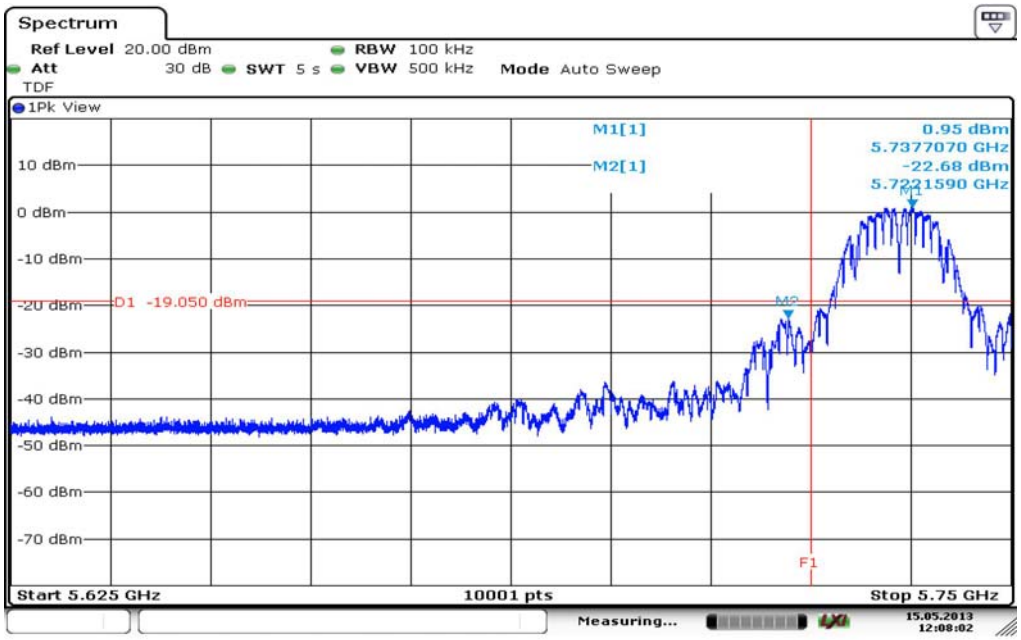
Plot 2: upper band edge



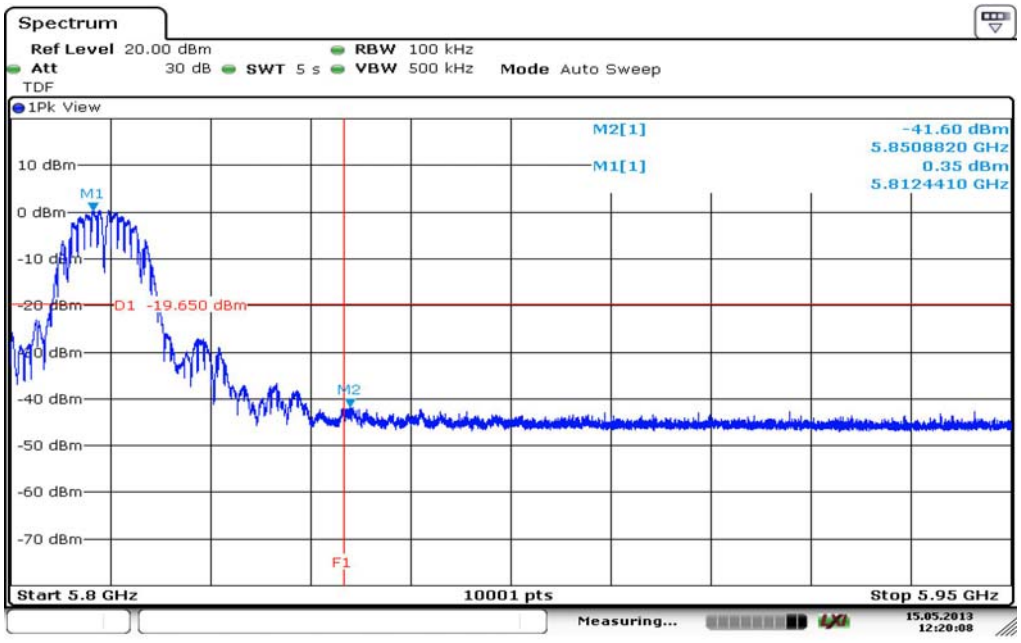
Date: 15.MAY.2013 12:22:11

Plots: DSSS, antenna port B, BPSK

Plot 1: lower band edge

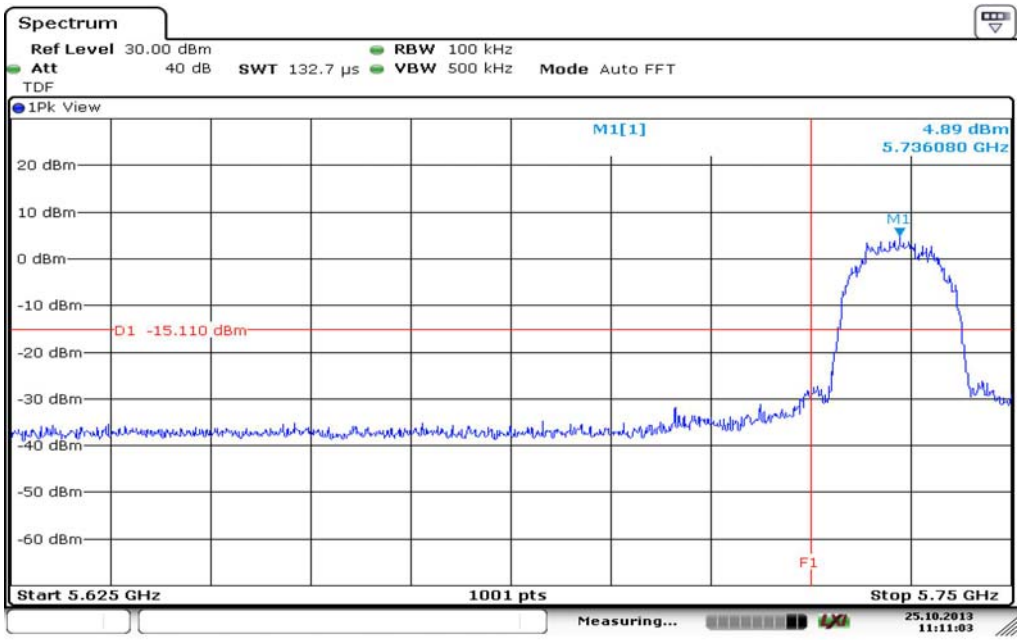


Plot 2: upper band edge



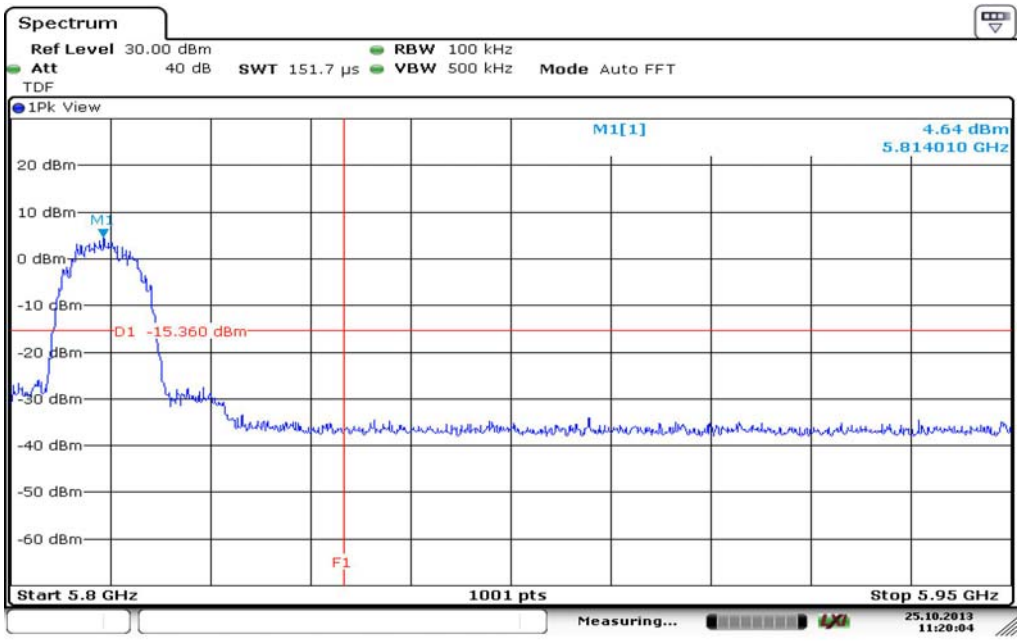
Plots: DSSS, antenna port A, QPSK

Plot 1: lower band edge



Date: 25.OCT.2013 11:11:04

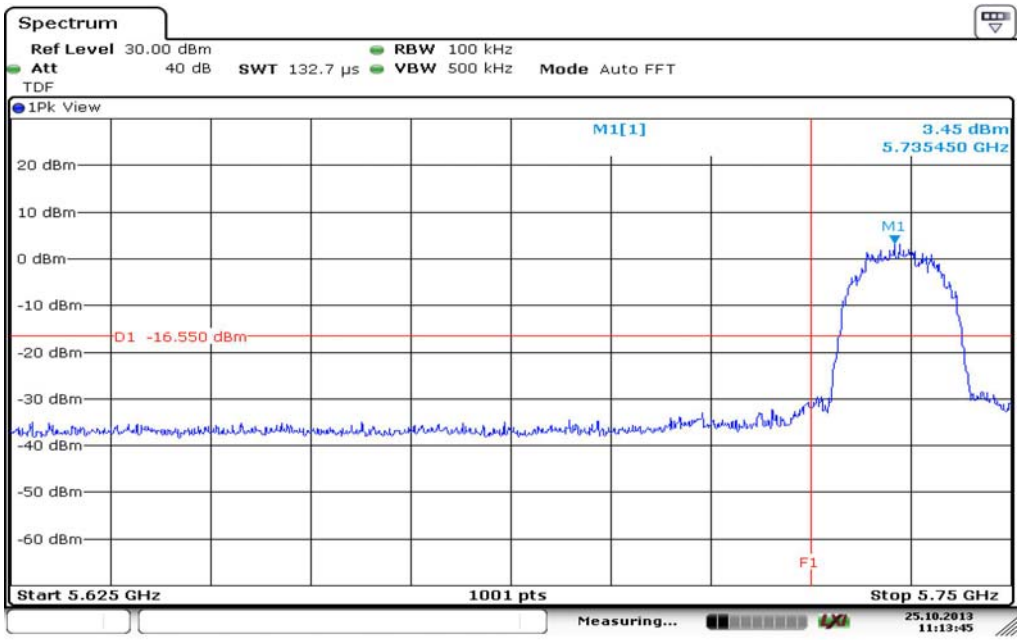
Plot 2: upper band edge



Date: 25.OCT.2013 11:20:04

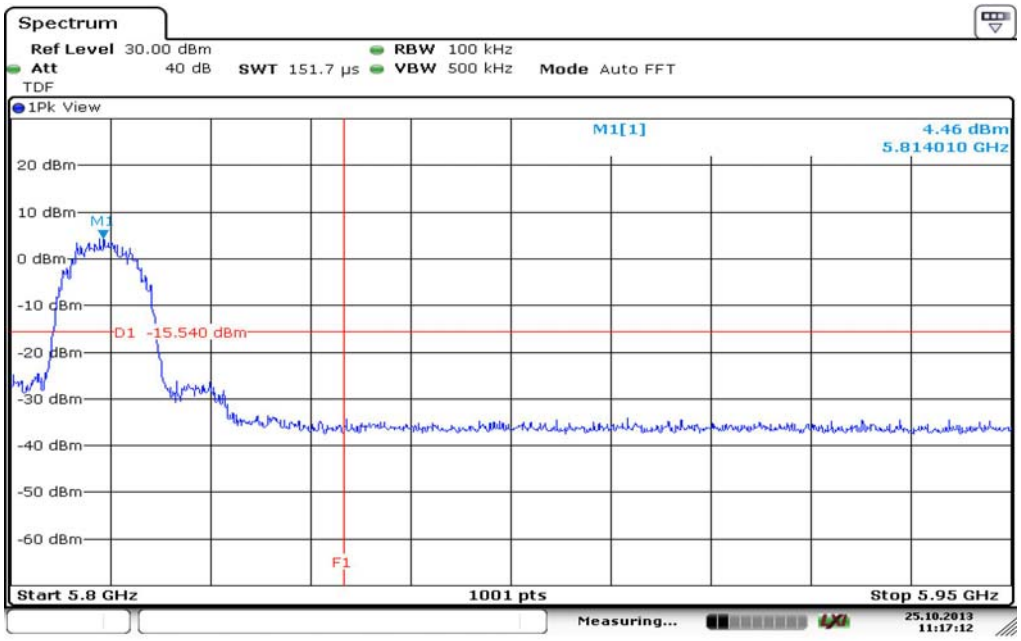
Plots: DSSS, antenna port B, QPSK

Plot 1: lower band edge



Date: 25.OCT.2013 11:13:45

Plot 2: upper band edge



Date: 25.OCT.2013 11:17:11

9.7 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode The measurement is performed at the lowest, middle and highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	9 kHz to 40 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
TX Spurious Emissions Conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required	

Results: DSSS, antenna port A, BPSK

TX Spurious Emissions Conducted DSSS, antenna port A					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5736		1.21	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5762		0.99	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5814		0.25	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

Results: DSSS, antenna port B, BPSK

TX Spurious Emissions Conducted DSSS, antenna port B					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5736		0.64	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5762		0.45	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5814		0.03	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

Results: DSSS, antenna port A, QPSK

TX Spurious Emissions Conducted DSSS, antenna port A					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5736		5.26	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5762		5.15	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5814		4.92	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

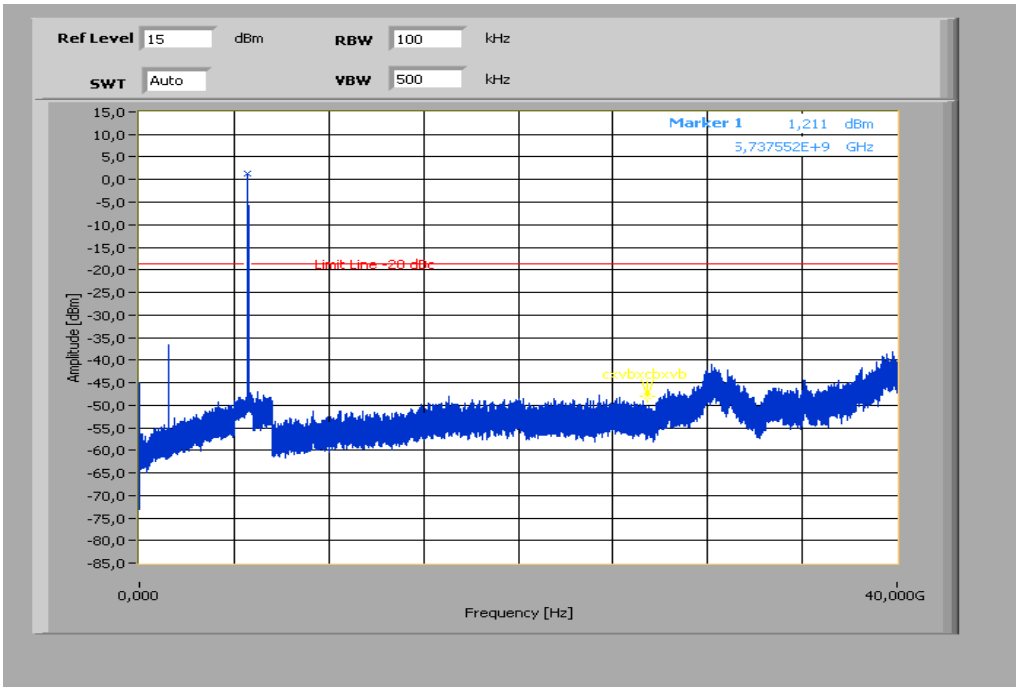
Results: DSSS, antenna port B, QPSK

TX Spurious Emissions Conducted DSSS, antenna port B					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
5736		3.85	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5762		4.24	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
5814		4.74	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

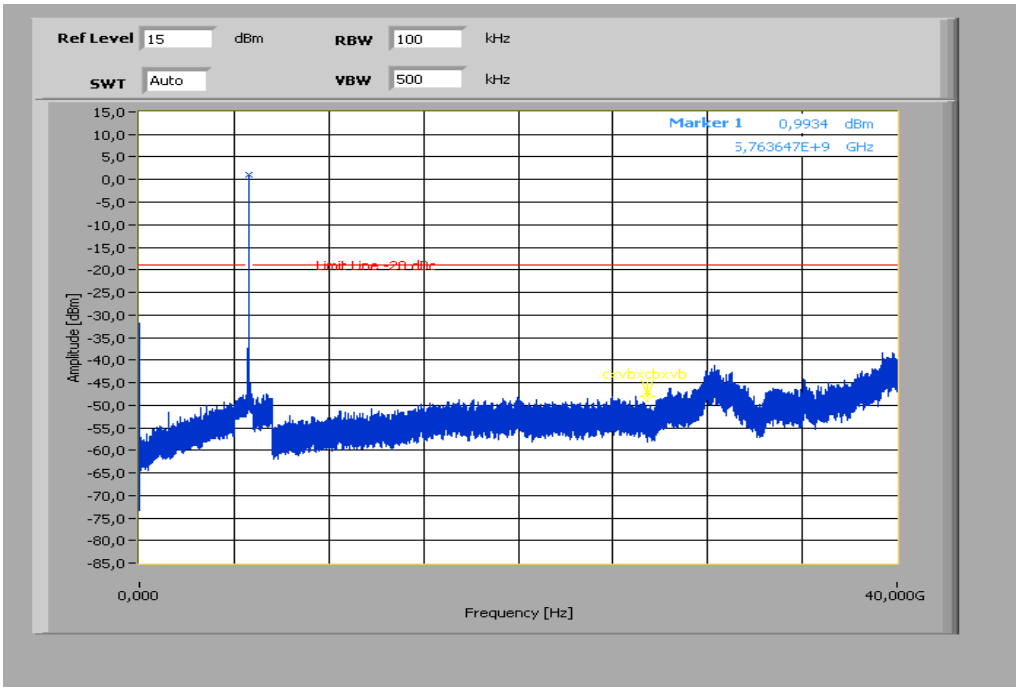
Plots: DSSS, antenna port A, BPSK

Plot 1: TX mode, lowest channel, up to 40 GHz



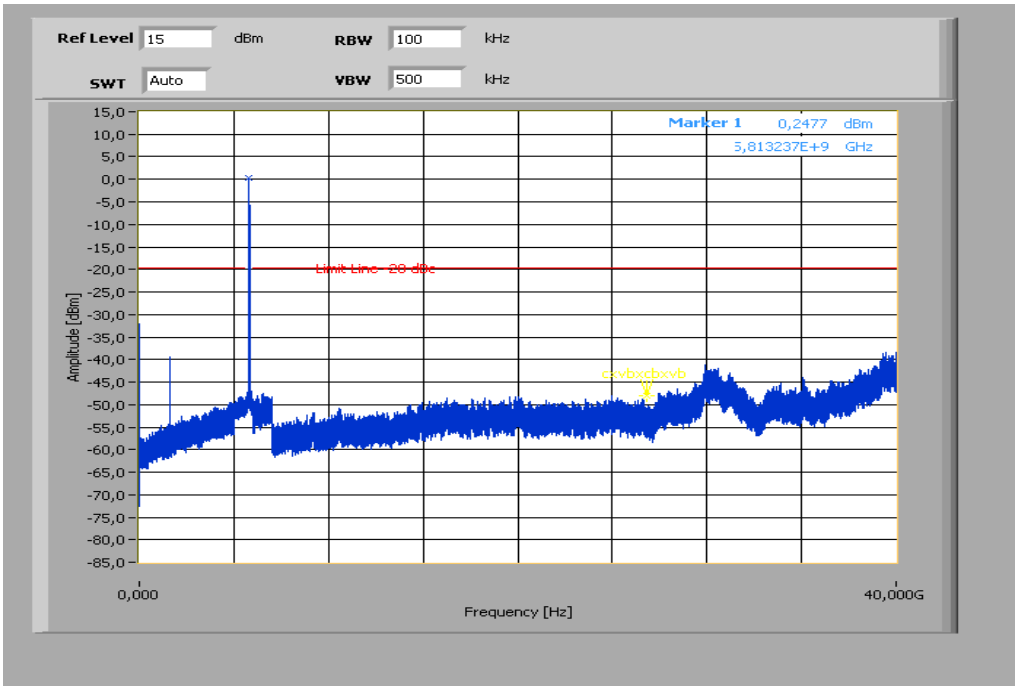
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

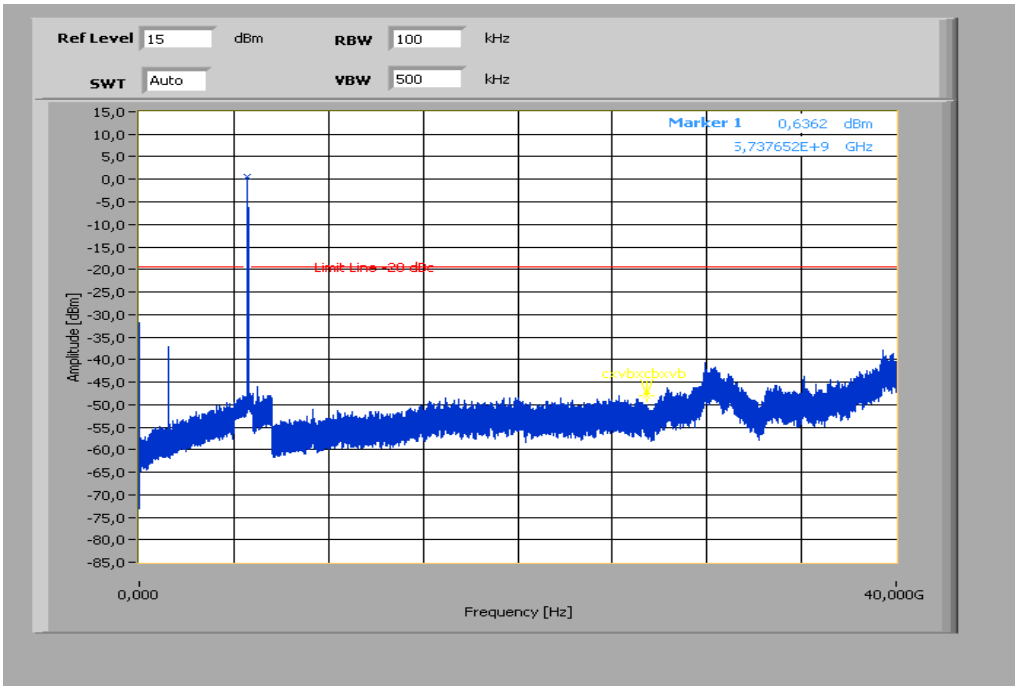
Plot 3: TX mode, highest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

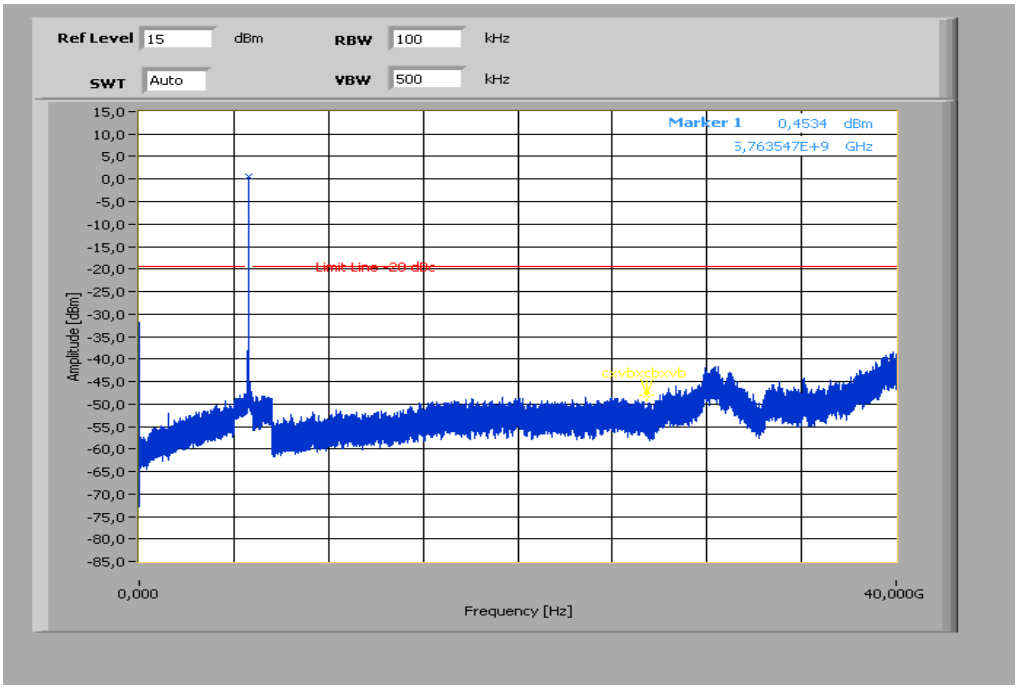
Plots: DSSS, antenna port B, BPSK

Plot 1: TX mode, lowest channel, up to 40 GHz



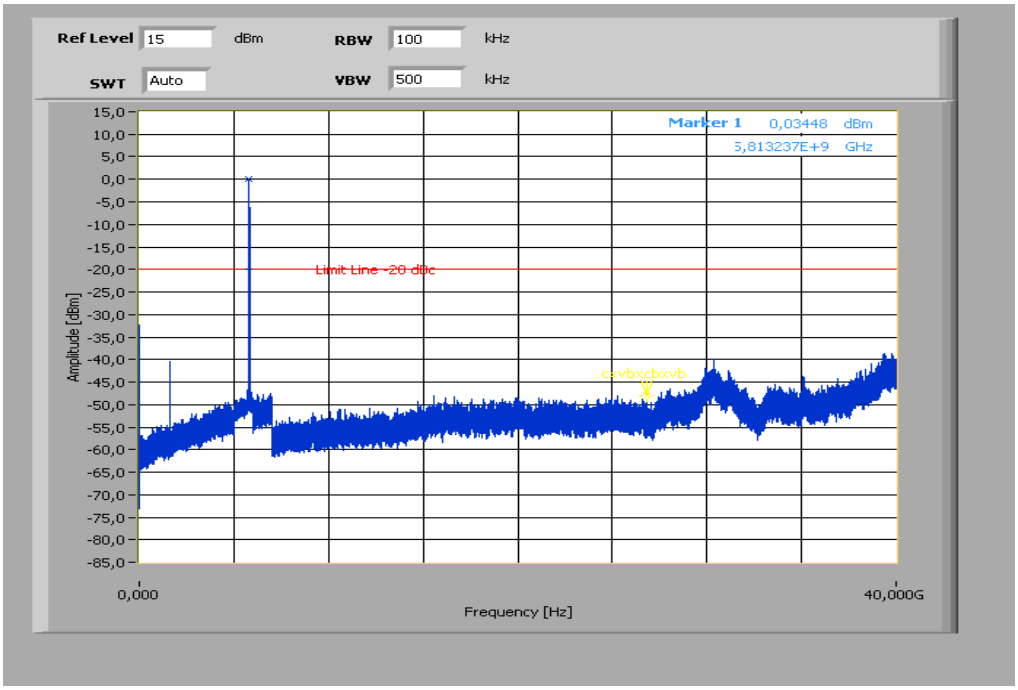
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

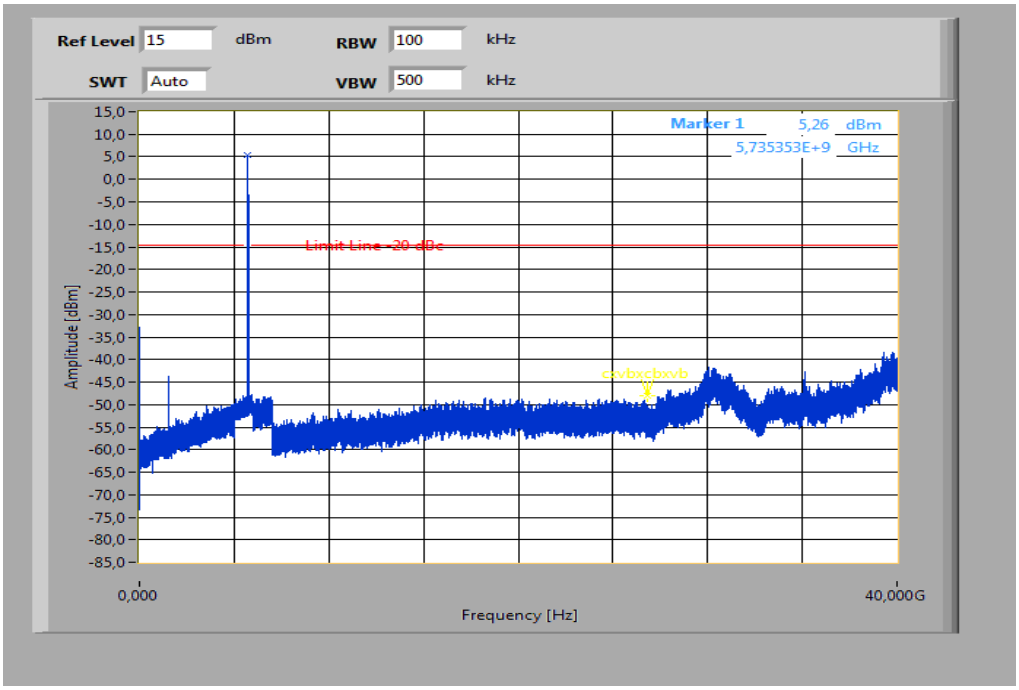
Plot 3: TX mode, highest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

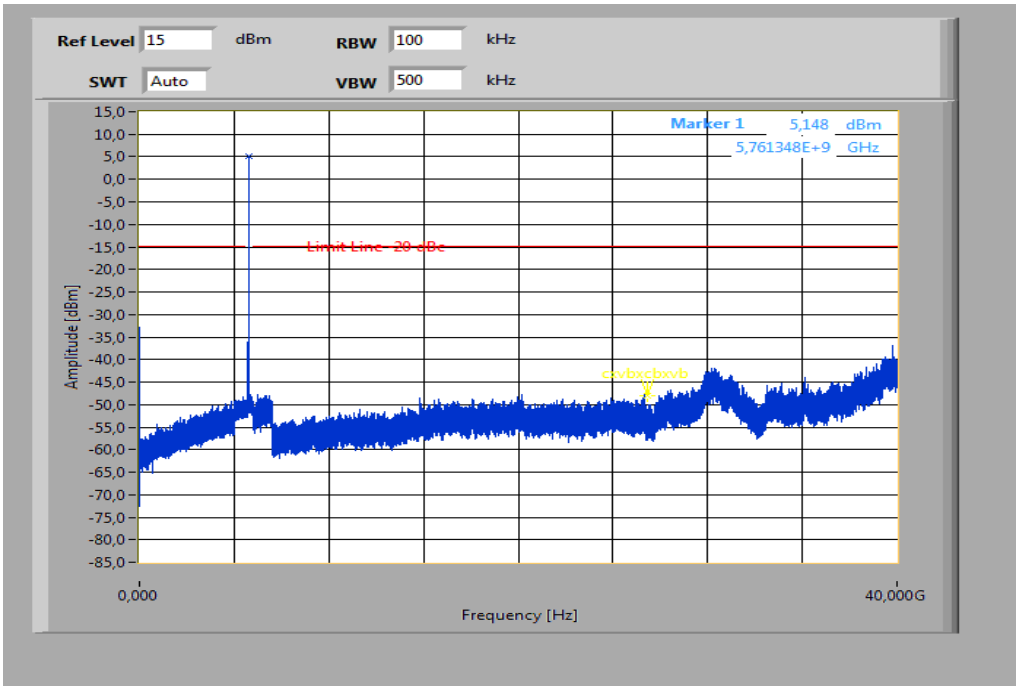
Plots: DSSS, antenna port A, QPSK

Plot 1: TX mode, lowest channel, up to 40 GHz



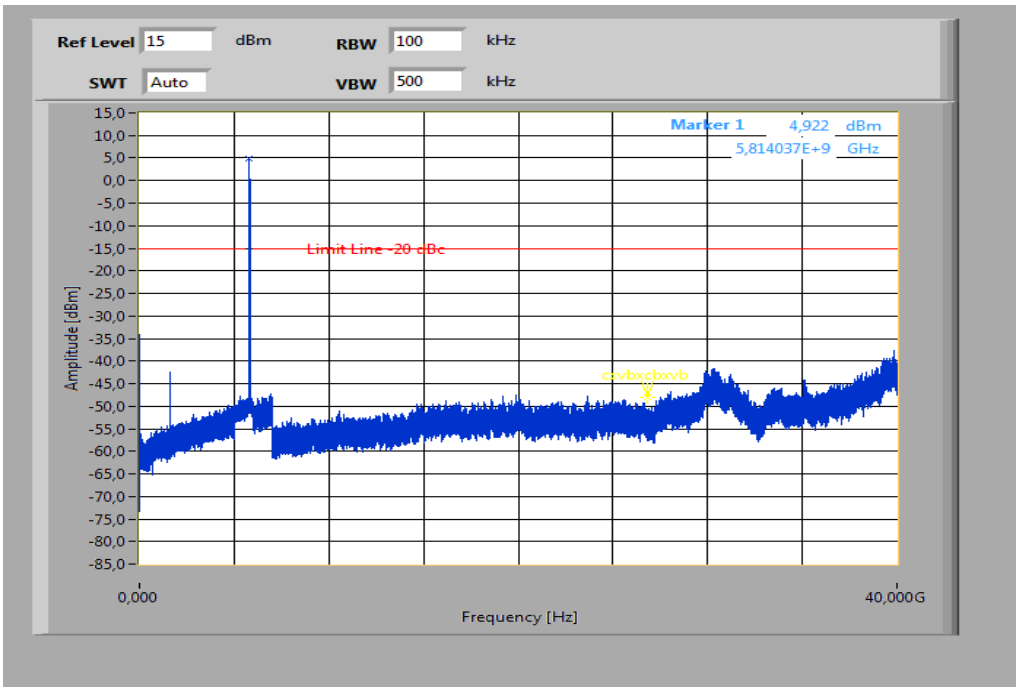
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

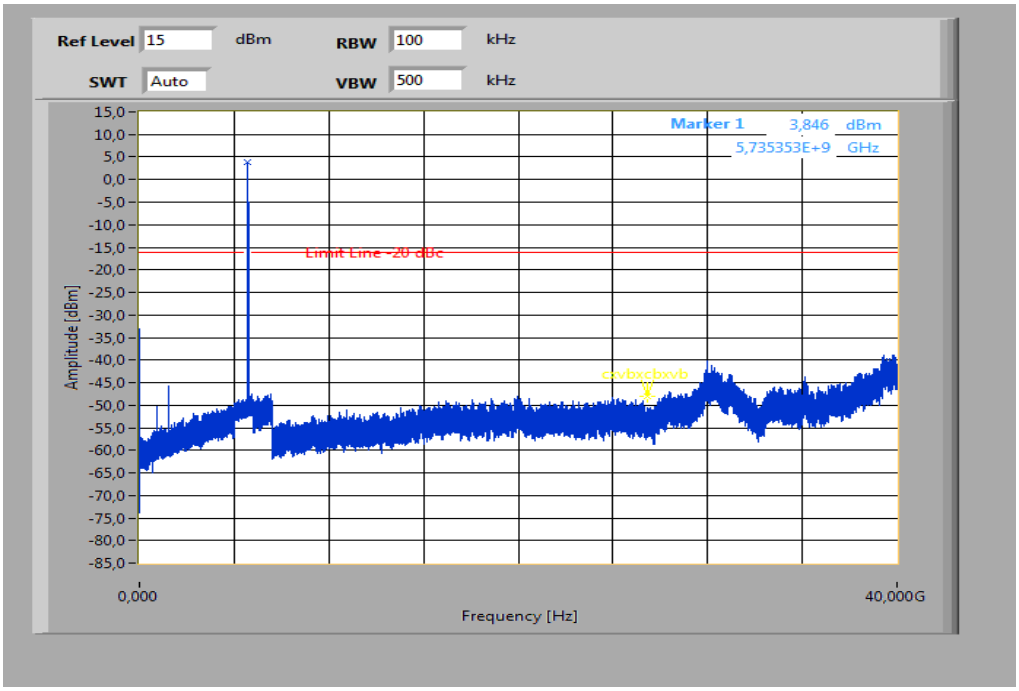
Plot 3: TX mode, highest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

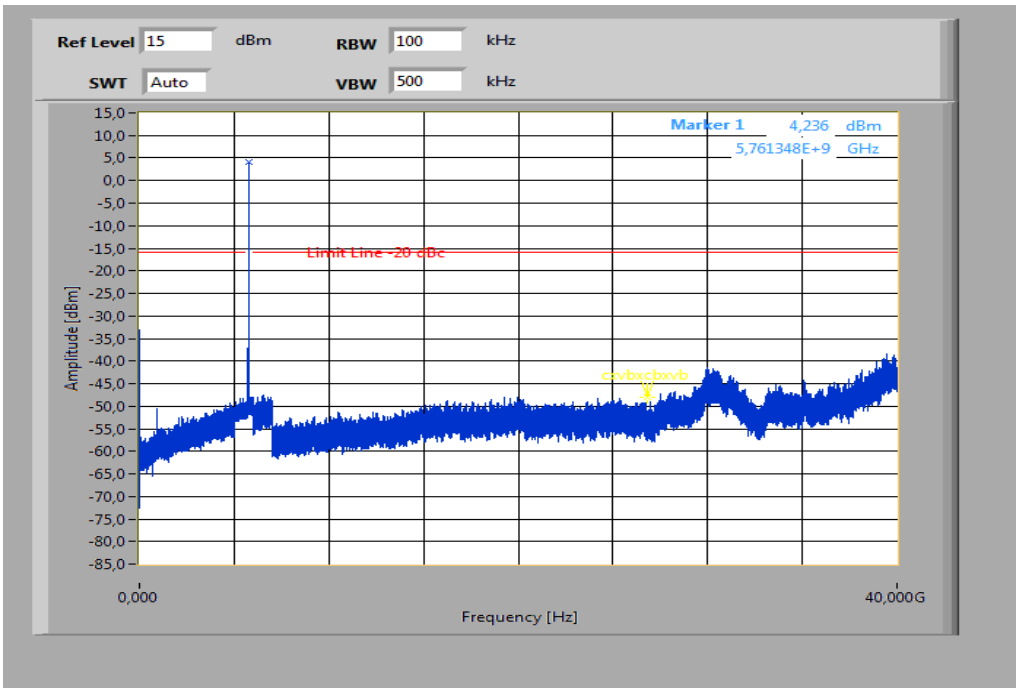
Plots: DSSS, antenna port B, QPSK

Plot 1: TX mode, lowest channel, up to 40 GHz



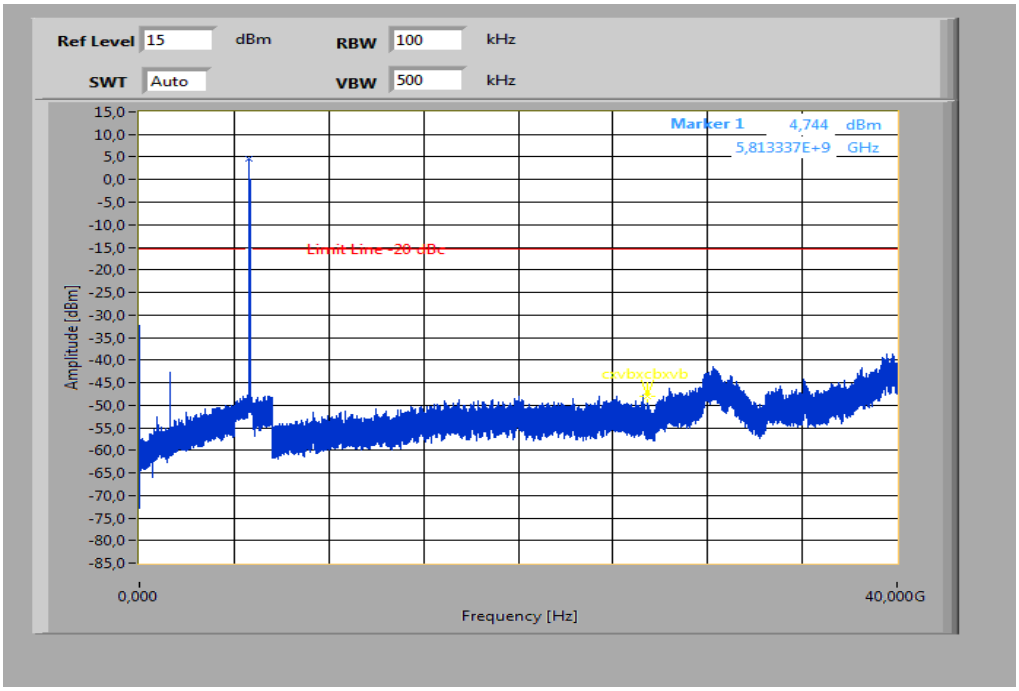
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

Plot 3: TX mode, highest channel, up to 40 GHz



The peak at the beginning of the plot is the LO from the SA.

9.8 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at the lowest, middle and highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 40 GHz
Trace-Mode:	Max Hold
Measured Modulation	☒ DSSS

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

FCC	IC	
TX Spurious Emissions Radiated		
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results: DSSS, antenna port A, BPSK

TX Spurious Emissions Radiated [dBµV/m]								
DSSS, antenna port A								
5736 MHz			5762 MHz			5814 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
3824	1 MHz Peak	40.0	3842	1 MHz Peak	38.39	3876	1 MHz Peak	36.63
						5334	1 MHz Peak	40.92
Measurement uncertainty			± 3 dB					

Result: **Passed**

Results: DSSS, antenna port B, BPSK

TX Spurious Emissions Radiated [dBµV/m]								
OFDM, antenna port B								
5736 MHz			5782 MHz			5814 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All detected emissions above 1 GHz are more than 20 dB below the limit.			All detected emissions above 1 GHz are more than 20 dB below the limit.			All detected emissions above 1 GHz are more than 20 dB below the limit.		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Results: DSSS, antenna port A, QPSK

TX Spurious Emissions Radiated [dBµV/m]								
DSSS, antenna port A								
5736 MHz			5762 MHz			5814 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All detected emissions above 1 GHz are more than 20 dB below the limit.			All detected emissions above 1 GHz are more than 20 dB below the limit.			All detected emissions above 1 GHz are more than 20 dB below the limit.		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Results: DSSS, antenna port B, QPSK

TX Spurious Emissions Radiated [dBµV/m]								
OFDM, antenna port B								
5736 MHz			5782 MHz			5814 MHz		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
All detected emissions above 1 GHz are more than 20 dB below the limit.			All detected emissions above 1 GHz are more than 20 dB below the limit.			All detected emissions above 1 GHz are more than 20 dB below the limit.		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Plots: DSSS, antenna port A, BPSK

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

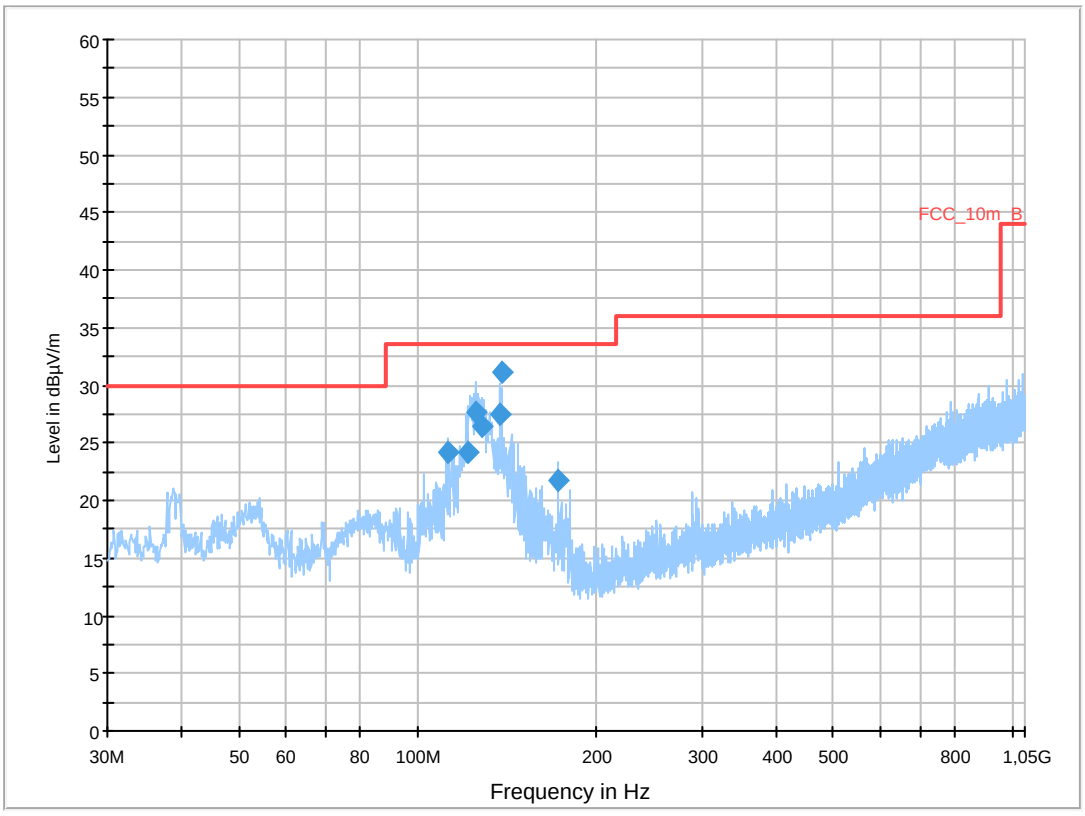
Common Information

EUT:	Quinta MU 3x (Revoluto)
Serial Number:	00001
Test Description:	FCC part 15 C class B @ 10 m
Operating Conditions:	5,2G, ANT A, 5180MHz
Operator Name:	Medrow
Comment:	AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

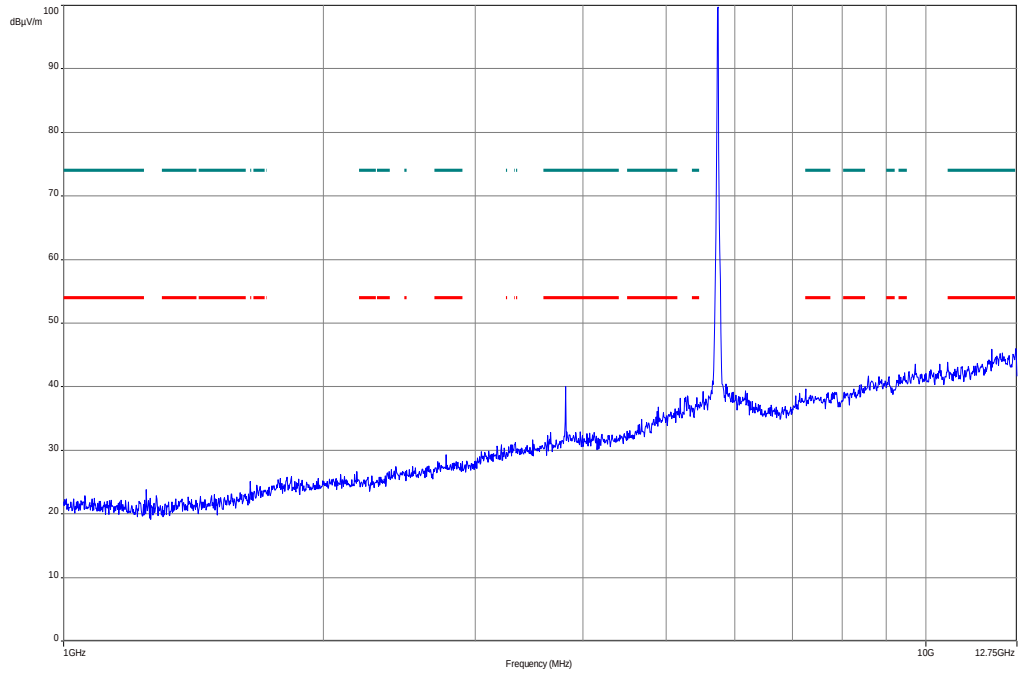
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



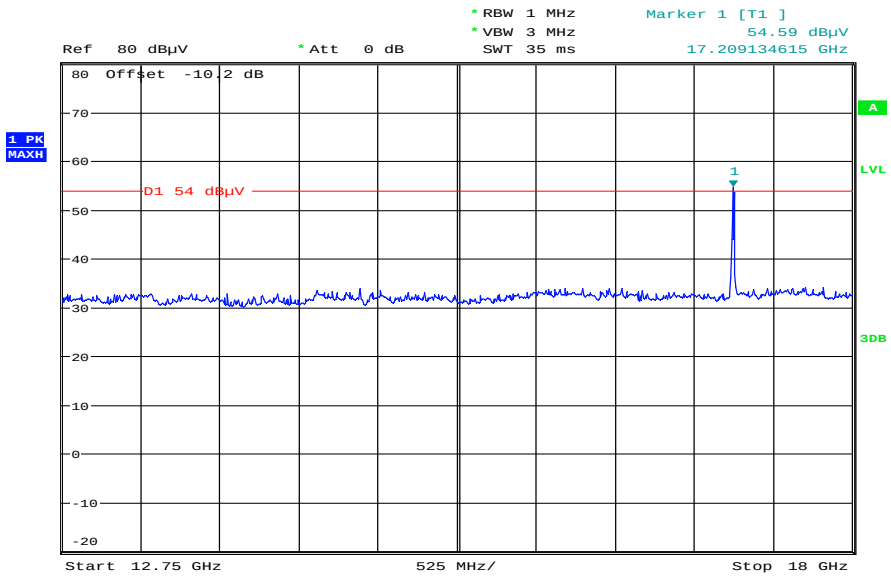
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
112.640250	24.2	1000.0	120.000	142.0	V	80.0	10.8	9.3	33.5	
121.618350	24.1	1000.0	120.000	170.0	V	170.0	10.1	9.4	33.5	
125.410350	27.7	1000.0	120.000	98.0	V	171.0	9.8	5.8	33.5	
128.079450	26.4	1000.0	120.000	122.0	V	170.0	9.6	7.1	33.5	
137.855250	27.5	1000.0	120.000	170.0	V	80.0	8.8	6.0	33.5	
137.970300	31.1	1000.0	120.000	170.0	V	10.0	8.8	2.4	33.5	

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



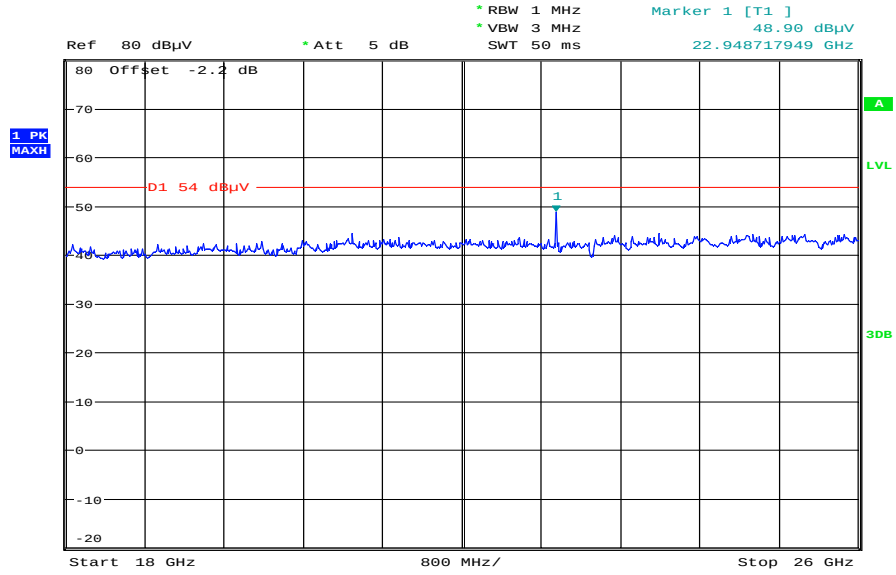
Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 12:53:36

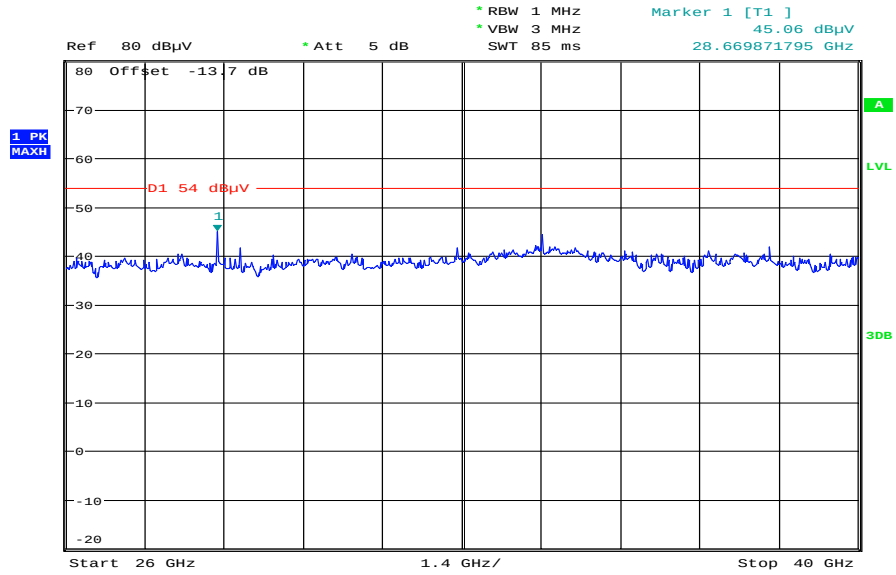
The detected emission does not fall into the restricted bands and is not rated.

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:09:54

Plot 5: Lowest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:41:44

Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

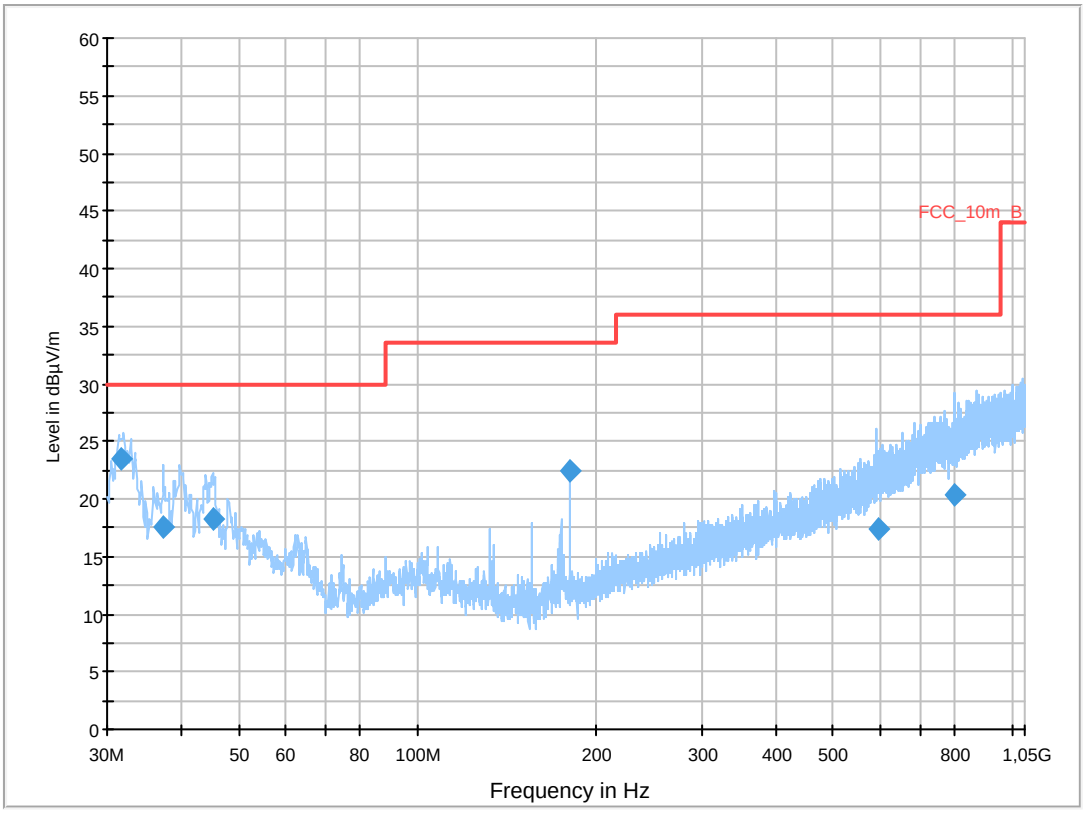
Common Information

EUT:	Quinta MU 3x (Revoluto)
Serial Number:	00001
Test Description:	FCC part 15 C class B @ 10 m
Operating Conditions:	5,2G, ANT A, 5210MHz
Operator Name:	Wolsdorfer
Comment:	AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

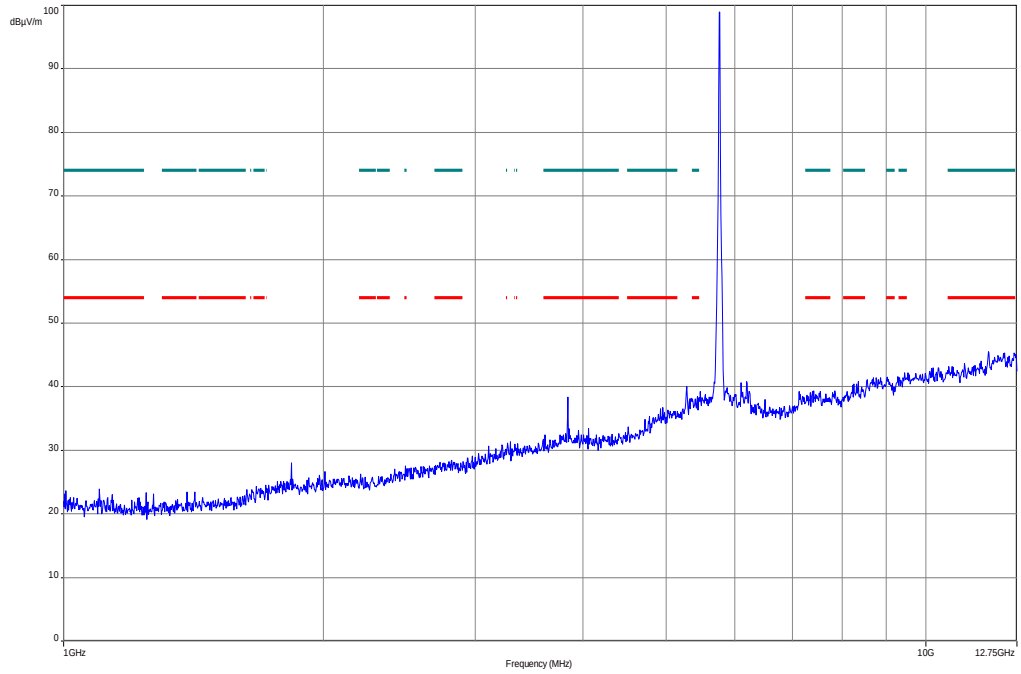
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



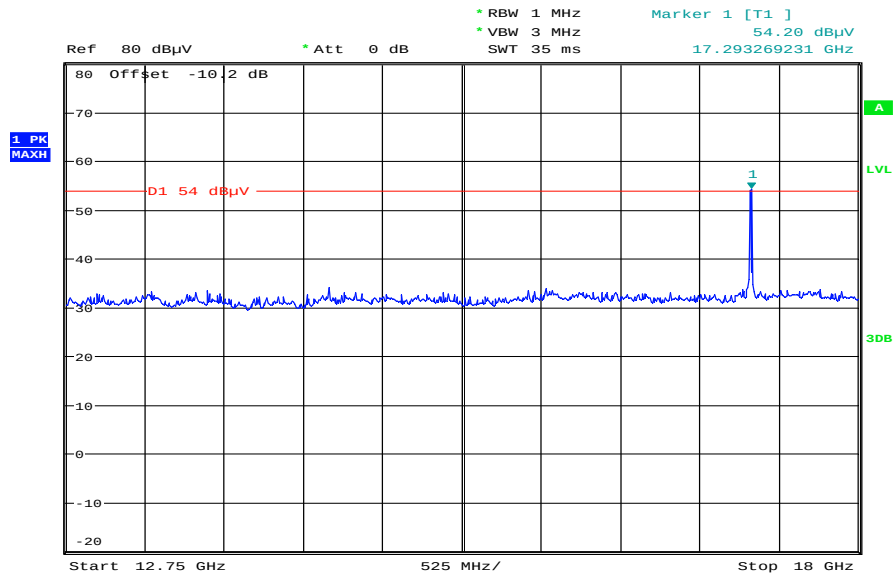
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.711200	23.5	1000.0	120.000	170.0	V	280.0	12.7	6.5	30.0	
37.364850	17.6	1000.0	120.000	98.0	V	3.0	13.2	12.4	30.0	
45.300900	18.2	1000.0	120.000	104.0	V	260.0	13.3	11.8	30.0	
180.016200	22.4	1000.0	120.000	122.0	V	270.0	10.4	11.1	33.5	
593.709150	17.3	1000.0	120.000	153.0	V	260.0	20.6	18.7	36.0	
800.731500	20.3	1000.0	120.000	170.0	V	-10.0	23.8	15.7	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



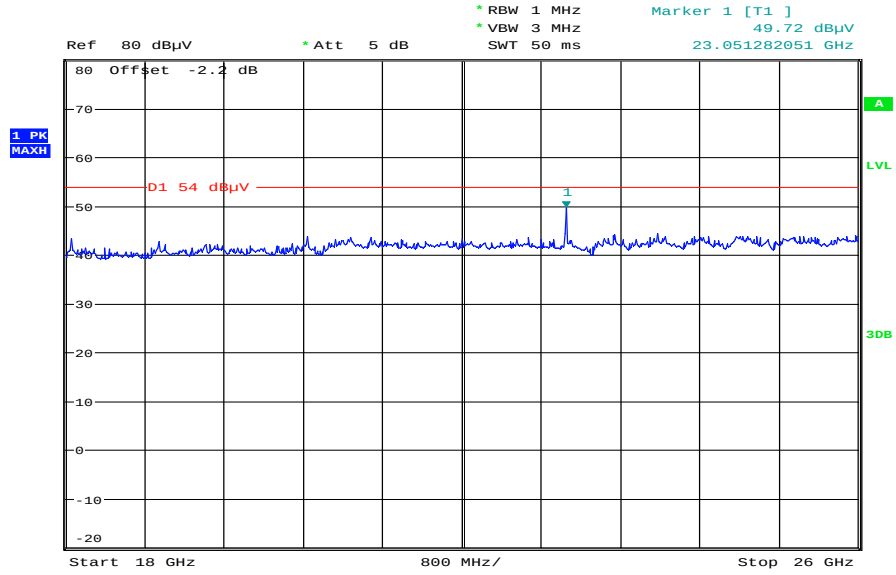
Plot 8: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 12:54:45

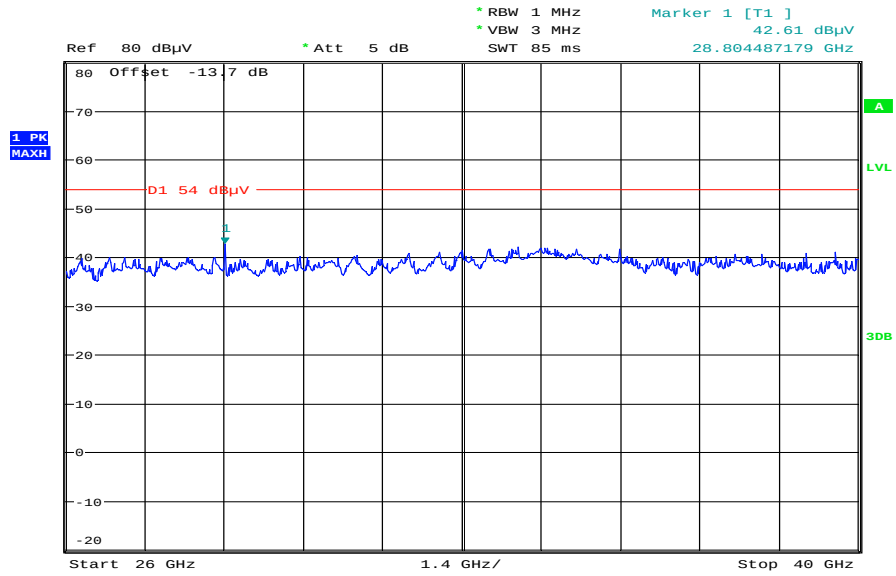
The detected emission does not fall into the restricted bands and is not rated.

Plot 9: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:10:44

Plot 10: Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:42:23

Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

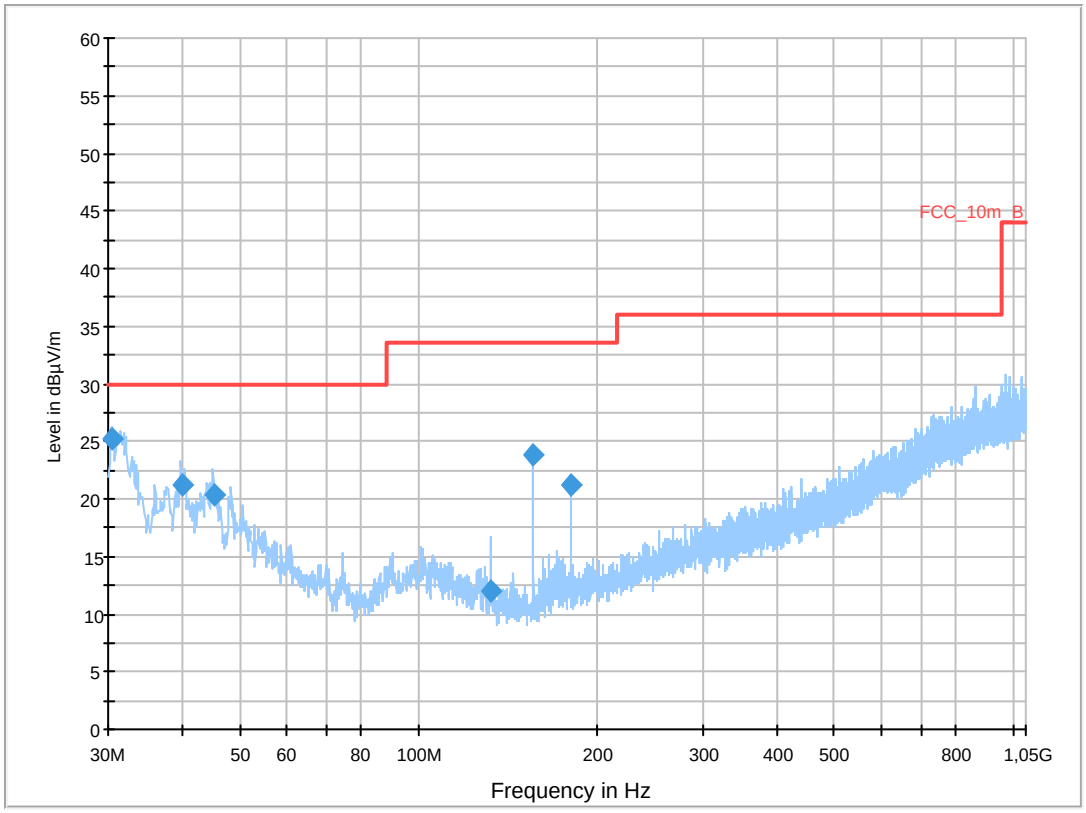
Common Information

EUT:	Quinta MU 3x (Revoluto)
Serial Number:	00001
Test Description:	FCC part 15 C class B @ 10 m
Operating Conditions:	5,2G, ANT A, 5240MHz
Operator Name:	Medrow
Comment:	AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

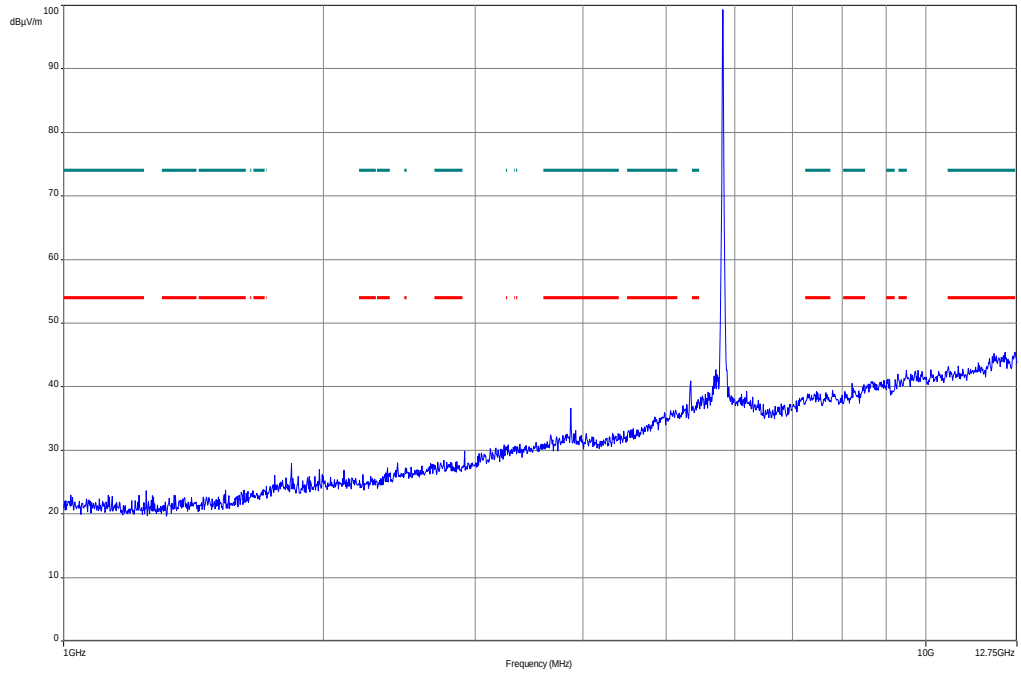
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



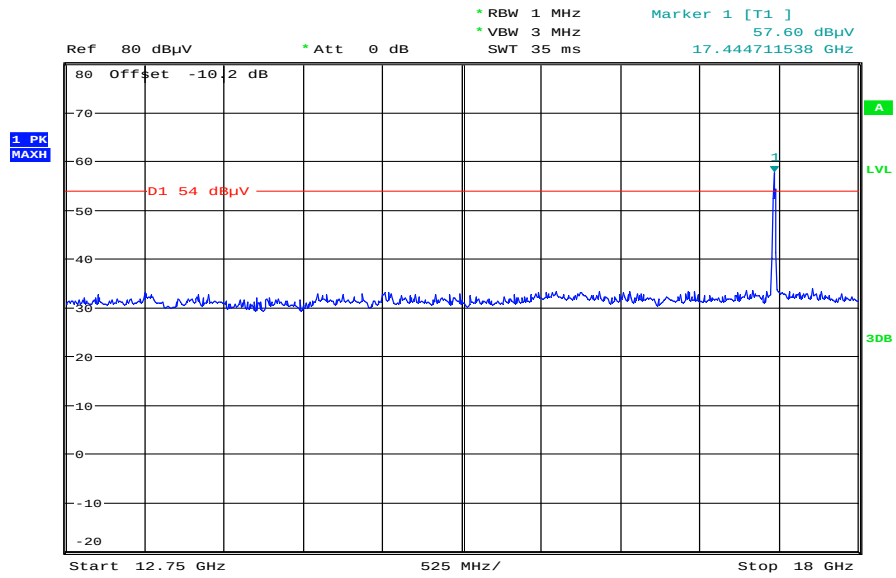
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.498619	25.1	1000.0	120.000	105.0	V	260.0	12.6	4.9	30.0	
39.893400	21.1	1000.0	120.000	98.0	V	280.0	13.4	8.9	30.0	
45.149250	20.3	1000.0	120.000	98.0	V	10.0	13.3	9.7	30.0	
131.988900	12.1	1000.0	120.000	170.0	V	265.0	9.3	21.4	33.5	
155.998950	23.7	1000.0	120.000	98.0	V	280.0	9.1	9.8	33.5	
180.002400	21.1	1000.0	120.000	98.0	V	190.0	10.4	12.4	33.5	

Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



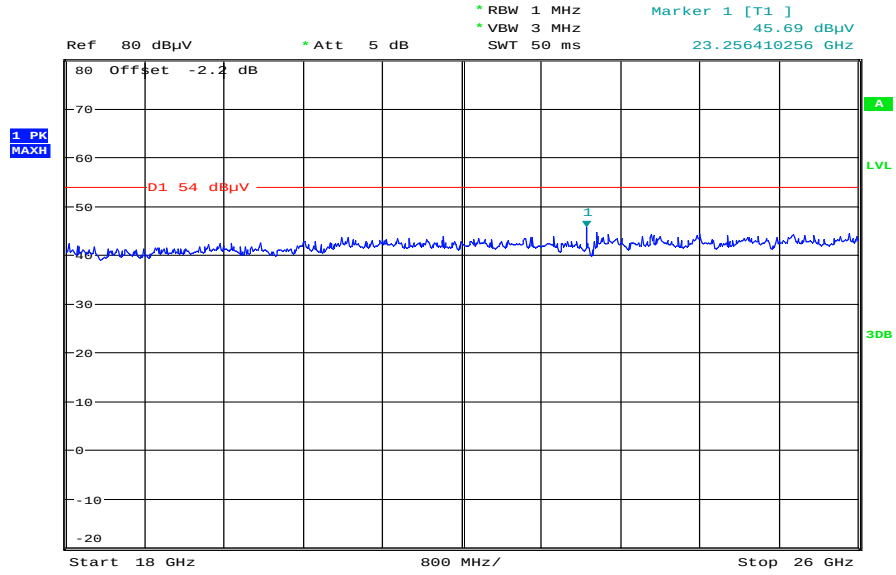
Plot 13: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 12:56:20

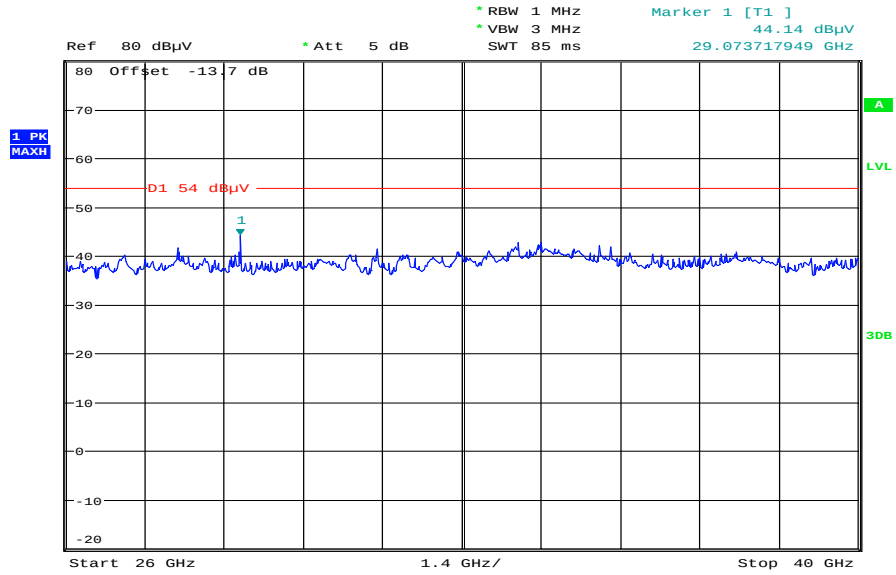
The detected emission does not fall into the restricted bands and is not rated.

Plot 14: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:12:19

Plot 15: Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:43:03

Plots: DSSS, antenna port B, BPSK

Plot 1: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

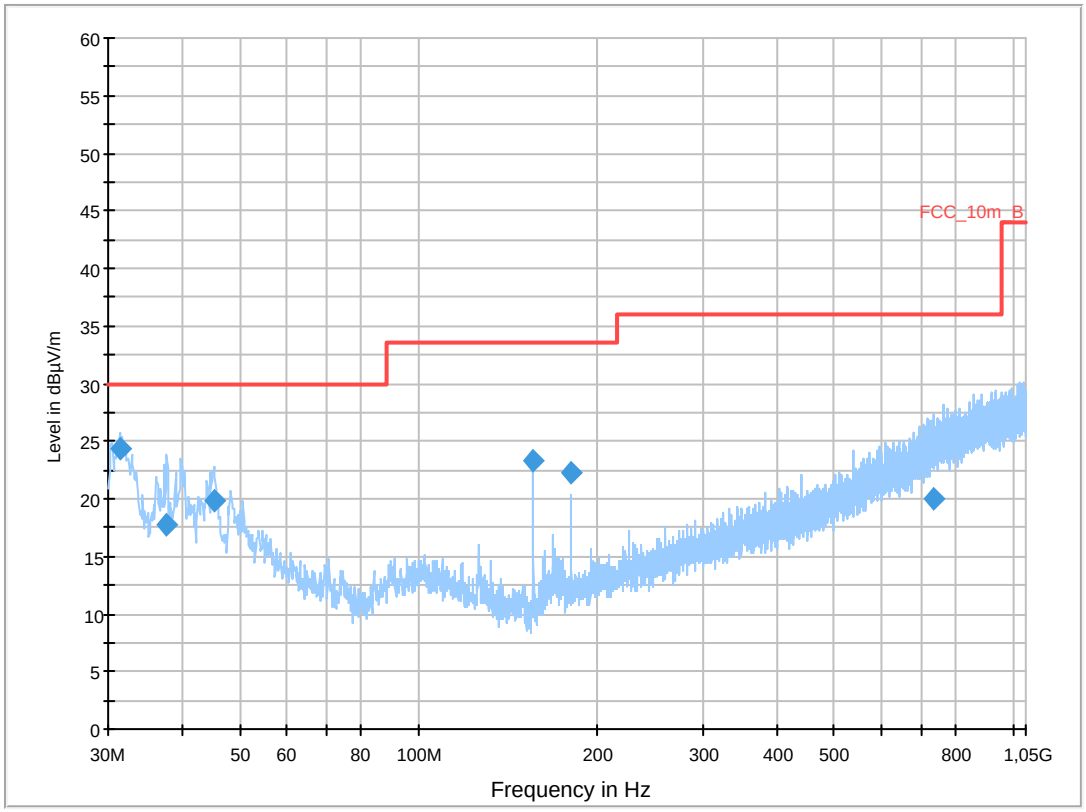
Common Information

EUT:	Quinta MU 3x (Revoluto) - USB removed - only premeasurement
Serial Number:	00001
Test Description:	FCC part 15 C class B @ 10 m
Operating Conditions:	5,2G, ANT B, 5210MHz
Operator Name:	Medrow
Comment:	AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

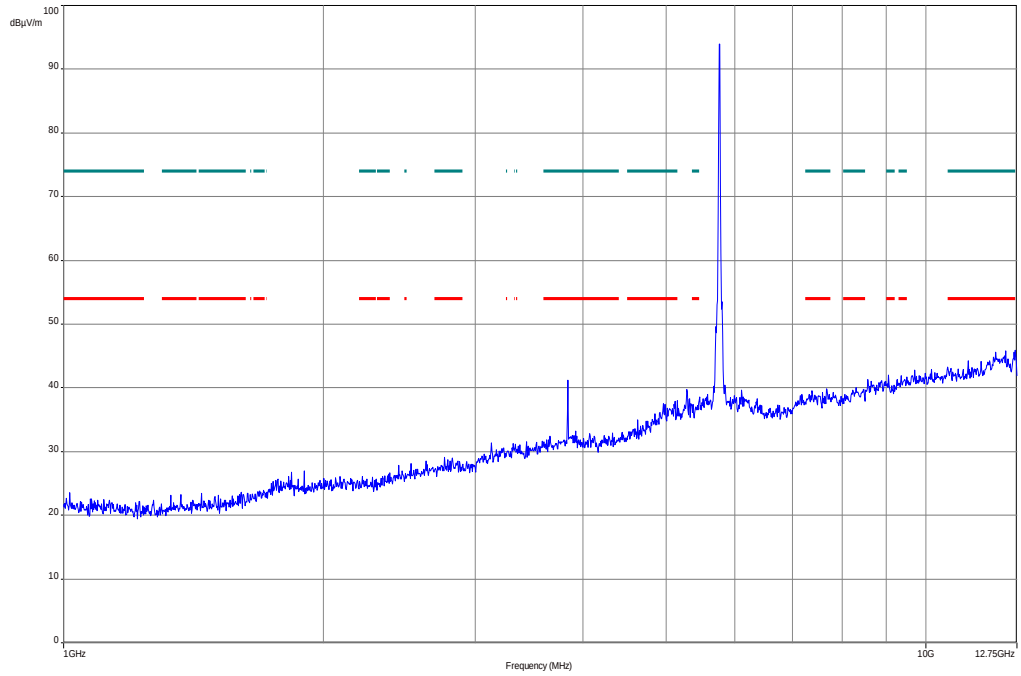
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



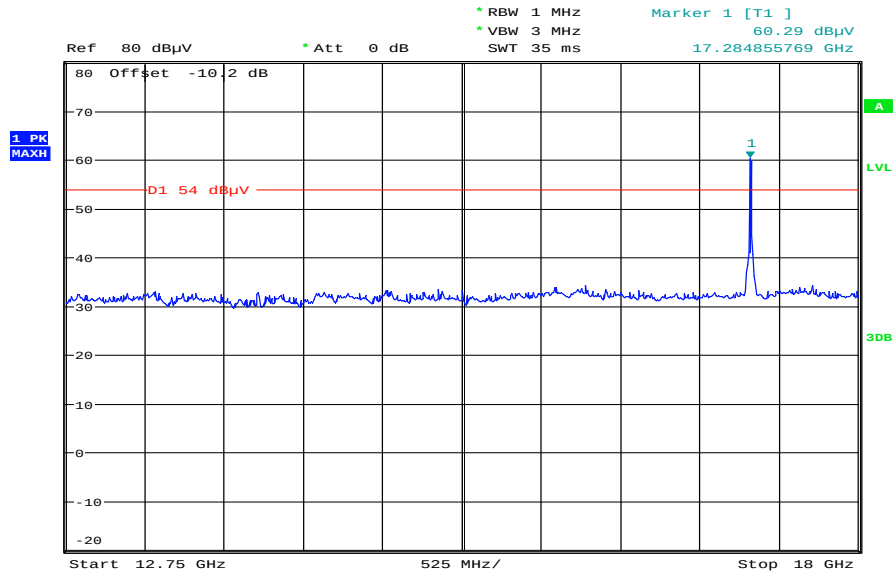
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.378950	24.3	1000.0	120.000	98.0	V	268.0	12.7	5.7	30.0	
37.626450	17.8	1000.0	120.000	170.0	V	280.0	13.2	12.2	30.0	
45.272100	19.8	1000.0	120.000	98.0	V	10.0	13.3	10.2	30.0	
155.983350	23.4	1000.0	120.000	98.0	V	280.0	9.1	10.1	33.5	
180.000000	22.2	1000.0	120.000	98.0	V	-9.0	10.4	11.3	33.5	
735.195150	20.0	1000.0	120.000	170.0	V	178.0	23.3	16.0	36.0	

Plot 2: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



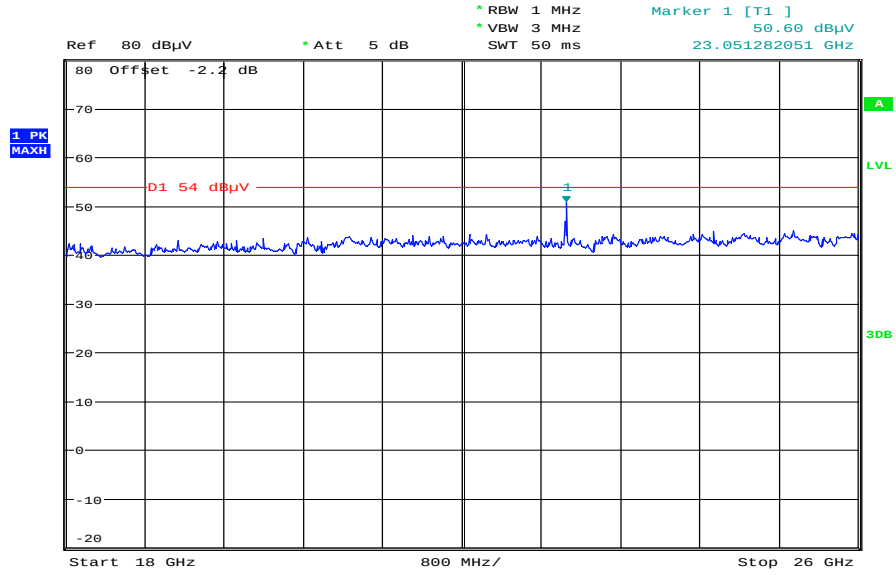
Plot 3: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 12:58:17

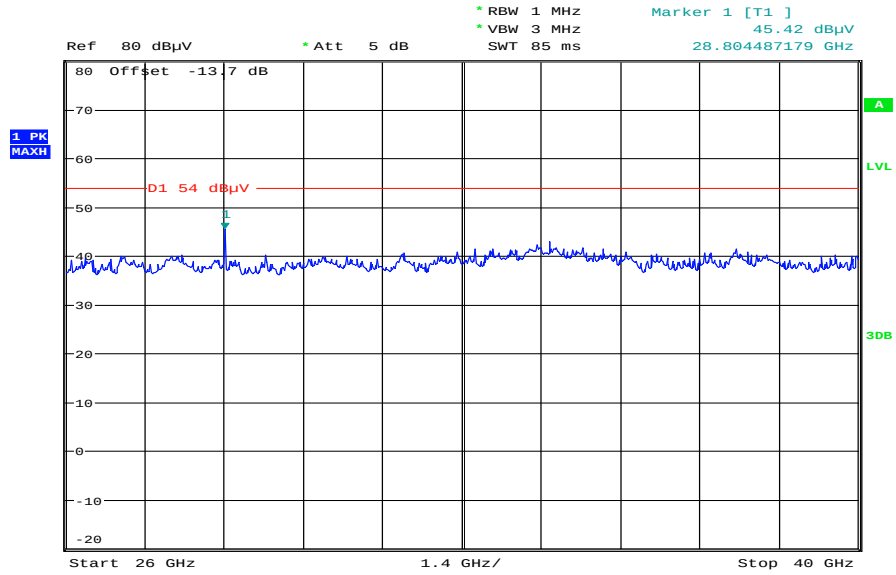
The detected emission does not fall into the restricted bands and is not rated.

Plot 4: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:14:38

Plot 5: Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:43:50

Plots: DSSS, antenna port A, QPSK

Plot 1: Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

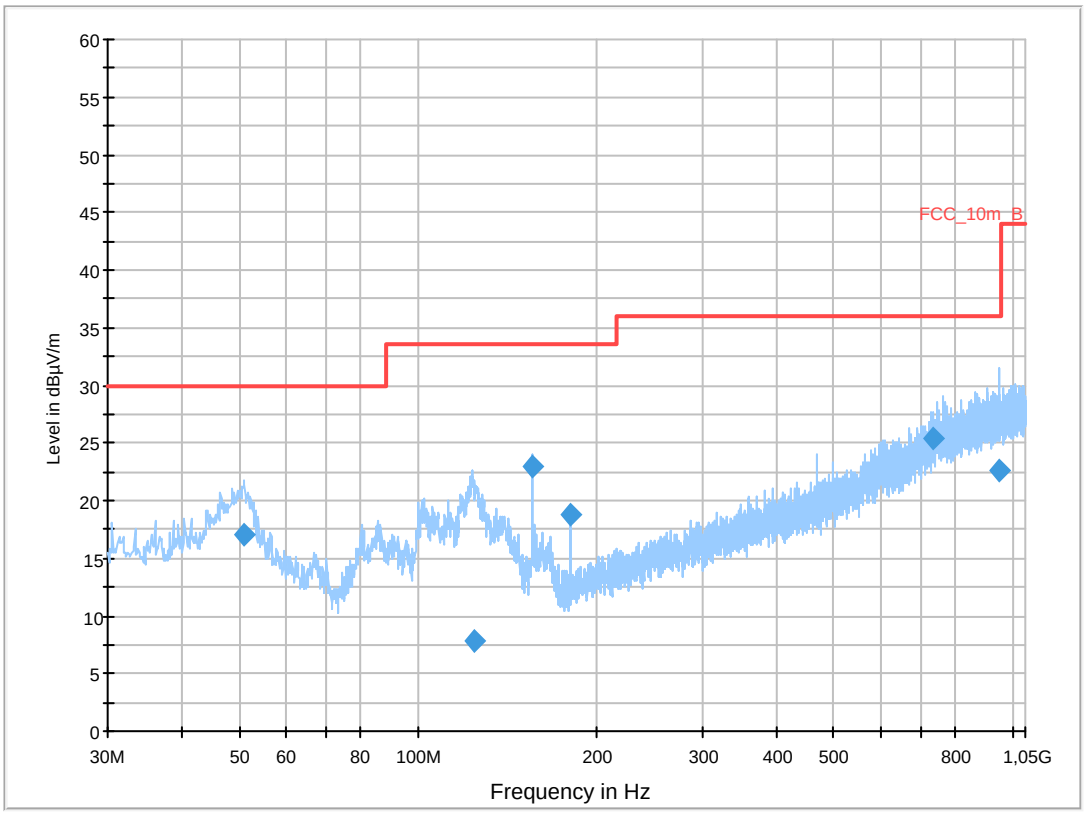
Common Information

Test Description:	FCC part 15 class B
Operating Conditions:	TX @5736MHz Ant. A
Operator Name:	Wolsdorfer
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

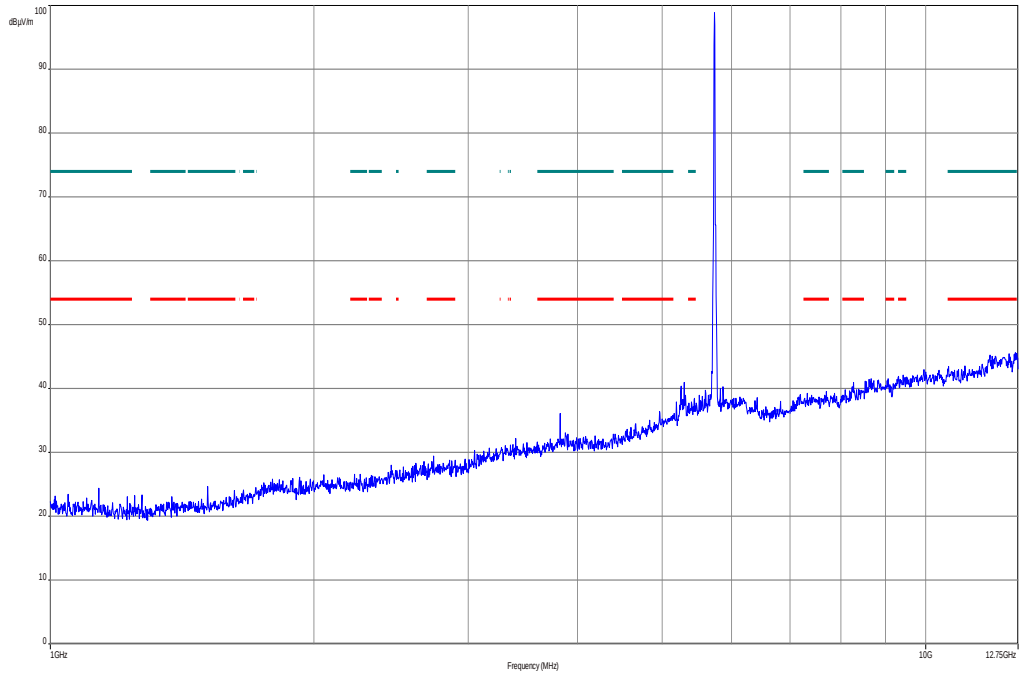
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



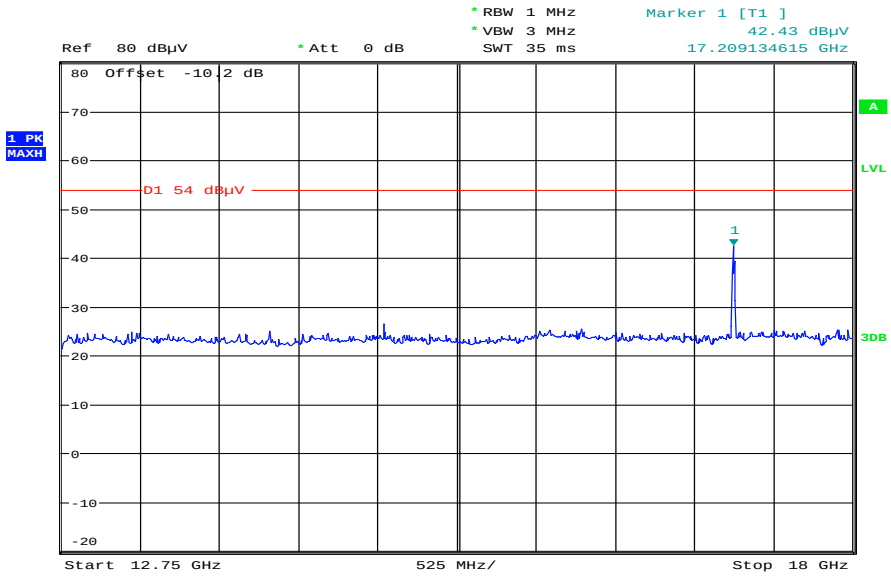
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
50.687850	17.1	1000.0	120.000	112.0	V	-3.0	13.3	12.9	30.0	
124.304700	7.8	1000.0	120.000	170.0	V	270.0	9.9	25.7	33.5	
156.004350	23.0	1000.0	120.000	98.0	V	280.0	9.1	10.5	33.5	
180.041250	18.8	1000.0	120.000	120.0	V	190.0	10.4	14.7	33.5	
731.979450	25.3	1000.0	120.000	98.0	H	180.0	23.2	10.7	36.0	
948.601050	22.7	1000.0	120.000	170.0	V	180.0	25.3	13.3	36.0	

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

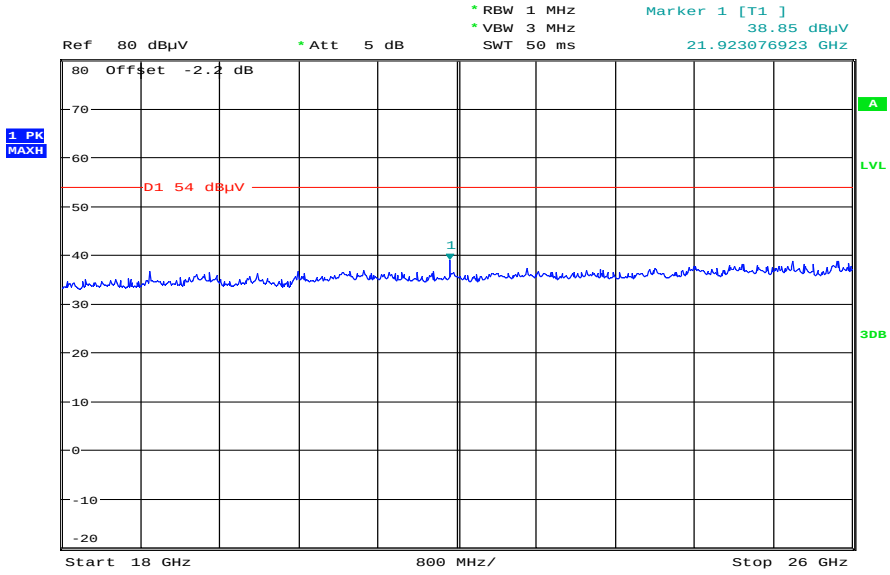


Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



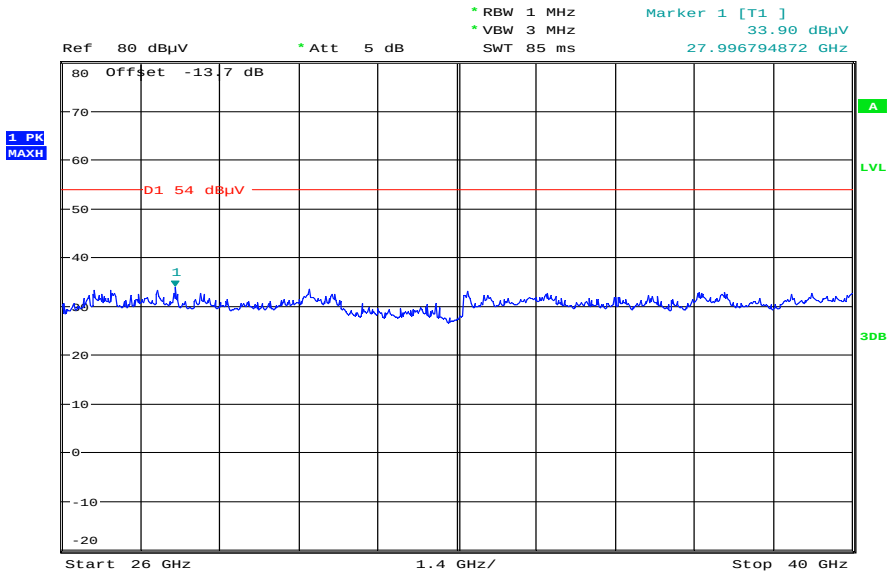
Date: 24.OCT.2013 14:29:23

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:12:20

Plot 5: Lowest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:25:43

Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

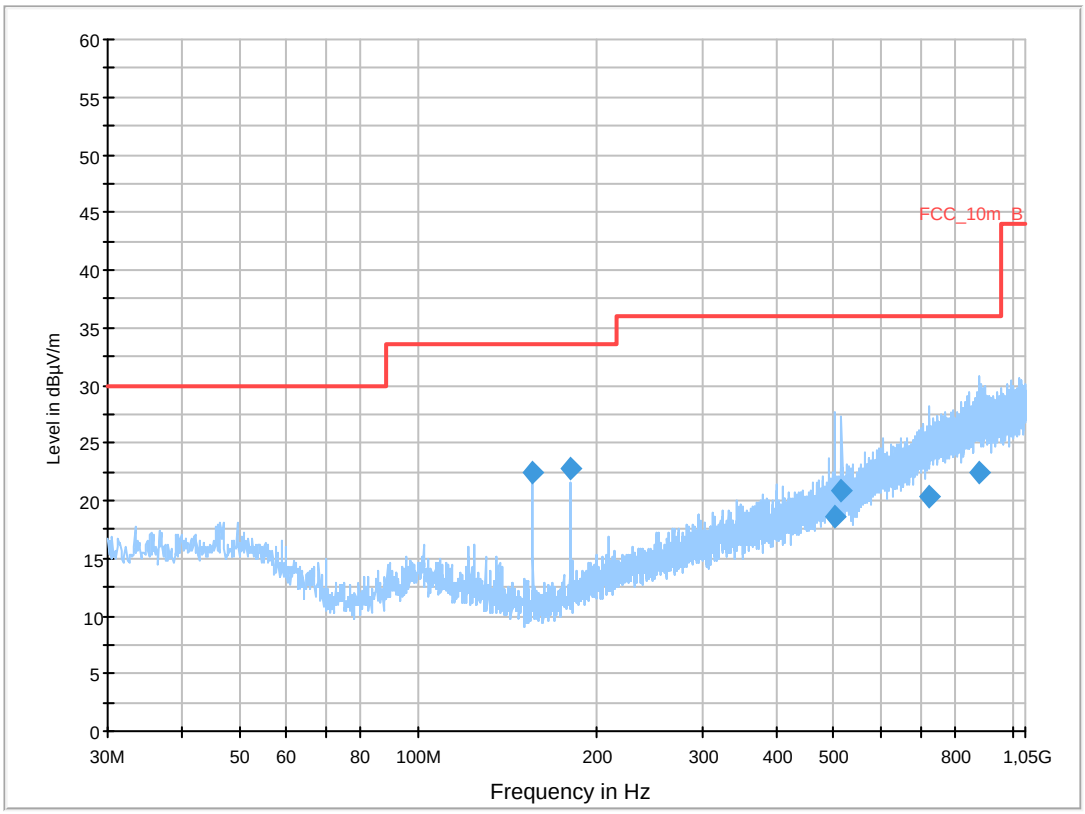
Common Information

Test Description:	FCC part 15 class B
Operating Conditions:	TX @5762MHz Ant. A
Operator Name:	Wolsdorfer
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

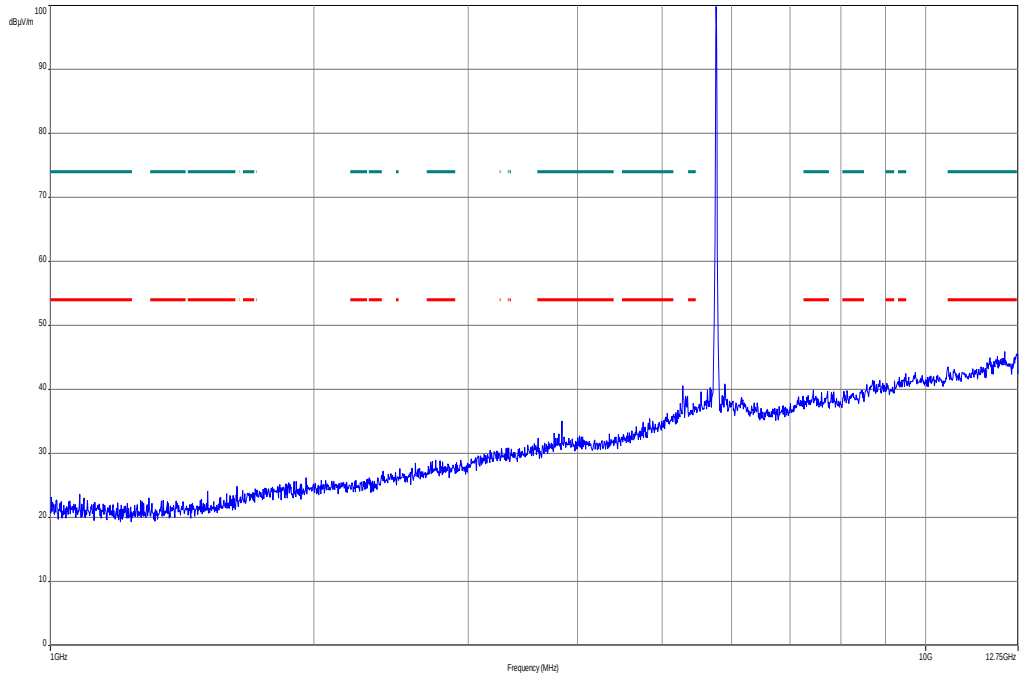
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



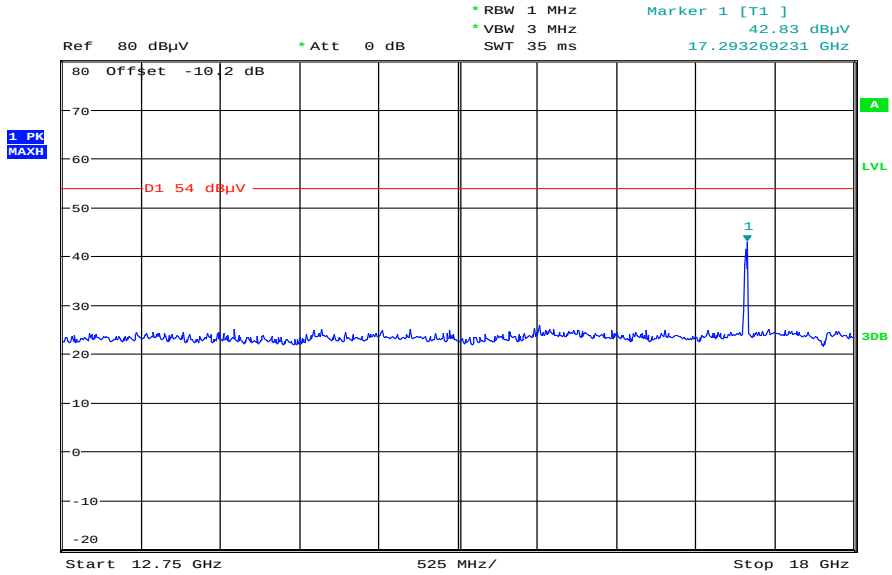
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
156.007500	22.4	1000.0	120.000	98.0	V	265.0	9.1	11.1	33.5	
180.026250	22.8	1000.0	120.000	98.0	V	265.0	10.4	10.7	33.5	
503.985300	18.6	1000.0	120.000	170.0	H	10.0	18.8	17.4	36.0	
516.004500	20.8	1000.0	120.000	170.0	H	10.0	18.9	15.2	36.0	
721.928400	20.4	1000.0	120.000	170.0	V	280.0	23.0	15.6	36.0	
875.380650	22.5	1000.0	120.000	170.0	H	-5.0	24.9	13.5	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

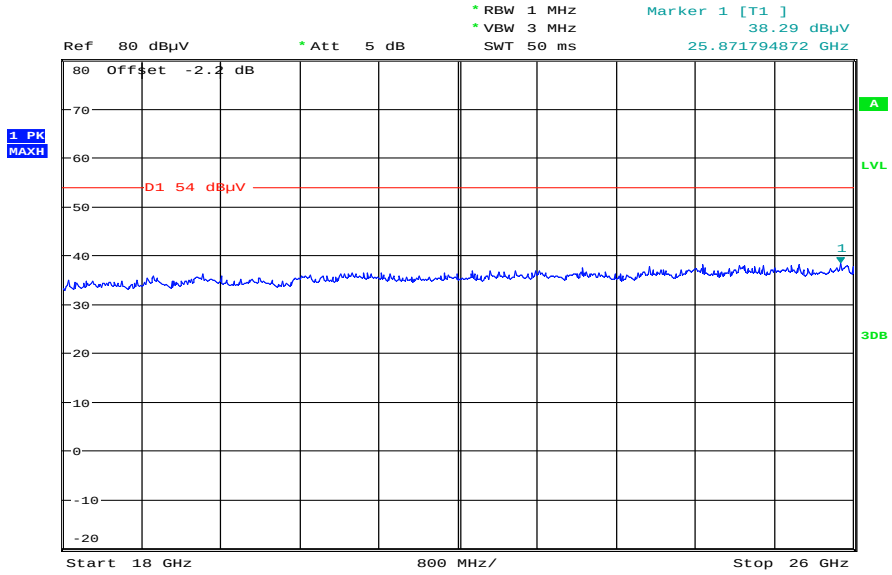


Plot 8: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



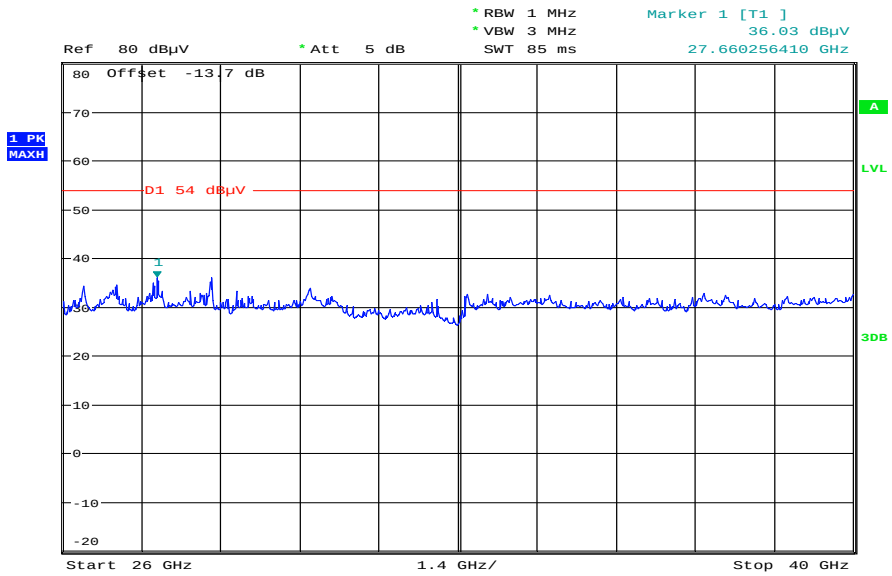
Date: 24.OCT.2013 14:30:22

Plot 9: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:13:28

Plot 10: Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:26:38

Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

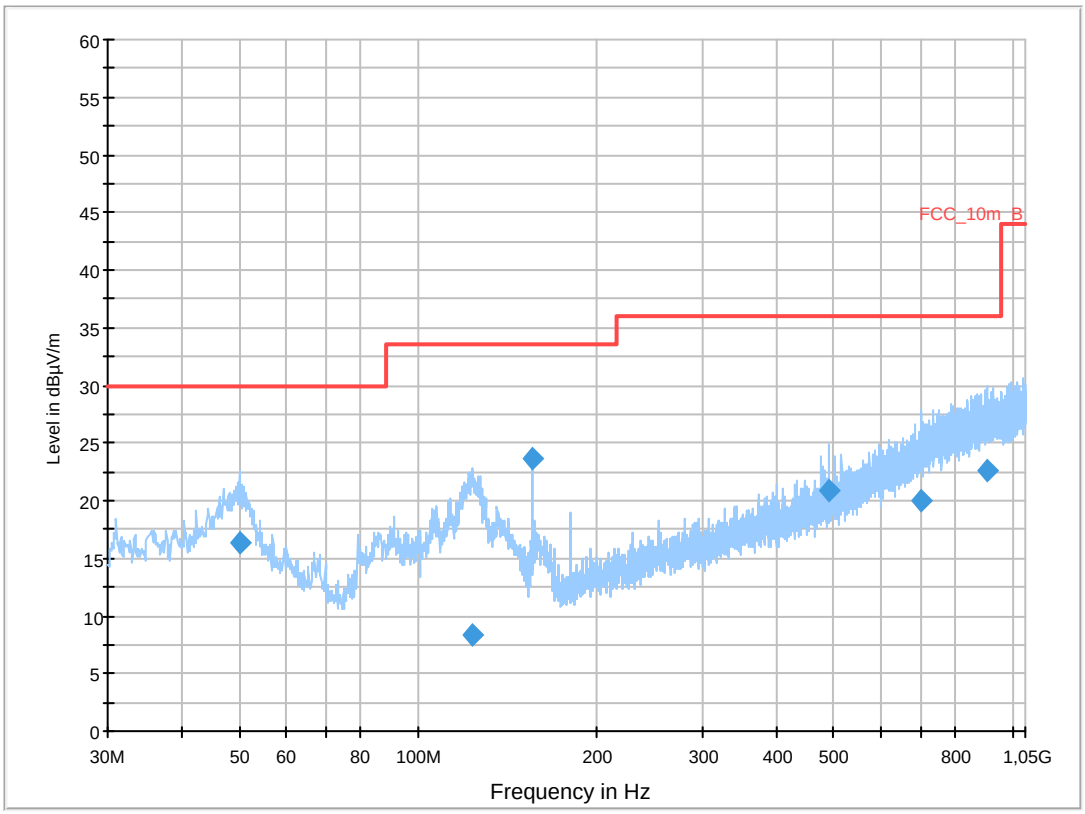
Common Information

Test Description:	FCC part 15 class B
Operating Conditions:	tx @5814MHz Ant. A
Operator Name:	Wolsdorfer
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

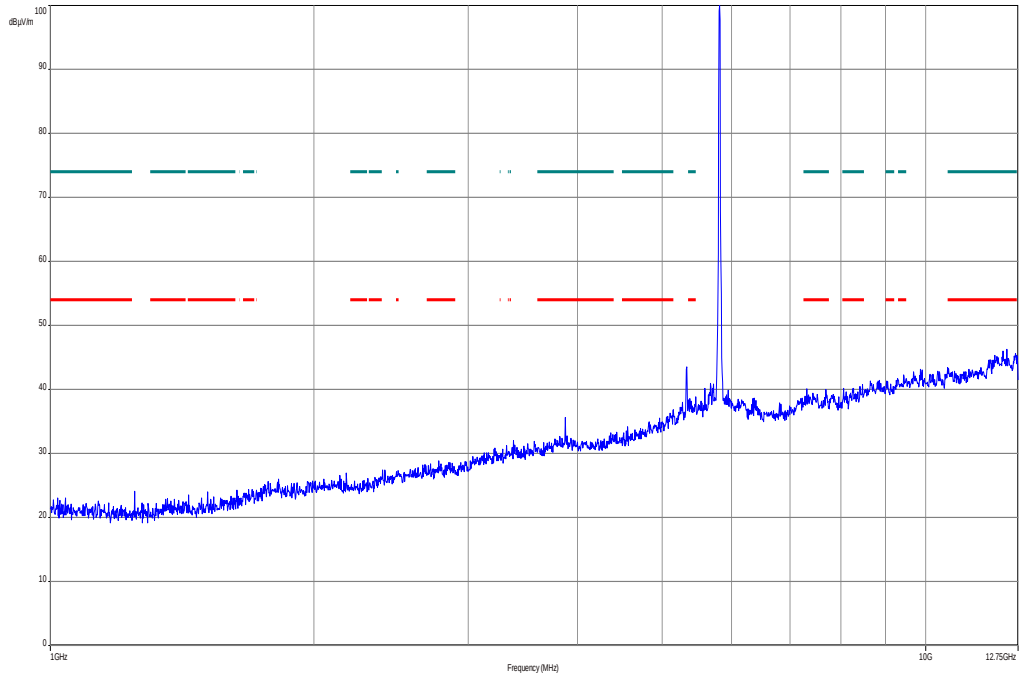
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



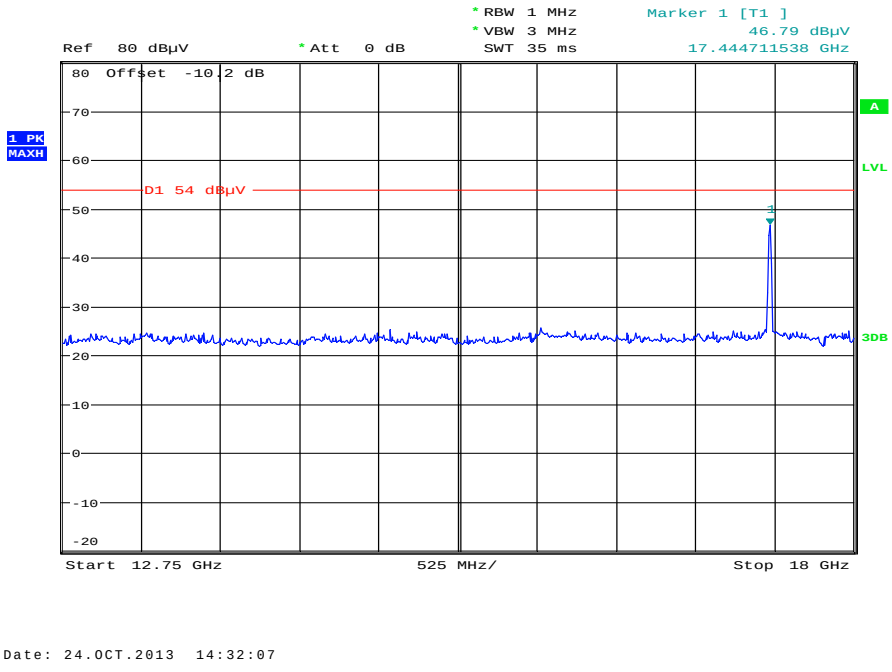
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
50.128200	16.4	1000.0	120.000	143.0	V	10.0	13.4	13.6	30.0	
122.827800	8.4	1000.0	120.000	112.0	V	270.0	10.0	25.1	33.5	
155.999250	23.6	1000.0	120.000	98.0	V	270.0	9.1	9.9	33.5	
491.972250	20.9	1000.0	120.000	170.0	H	180.0	18.5	15.1	36.0	
698.884800	19.9	1000.0	120.000	170.0	V	280.0	22.5	16.1	36.0	
908.574150	22.6	1000.0	120.000	170.0	H	170.0	25.2	13.4	36.0	

Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

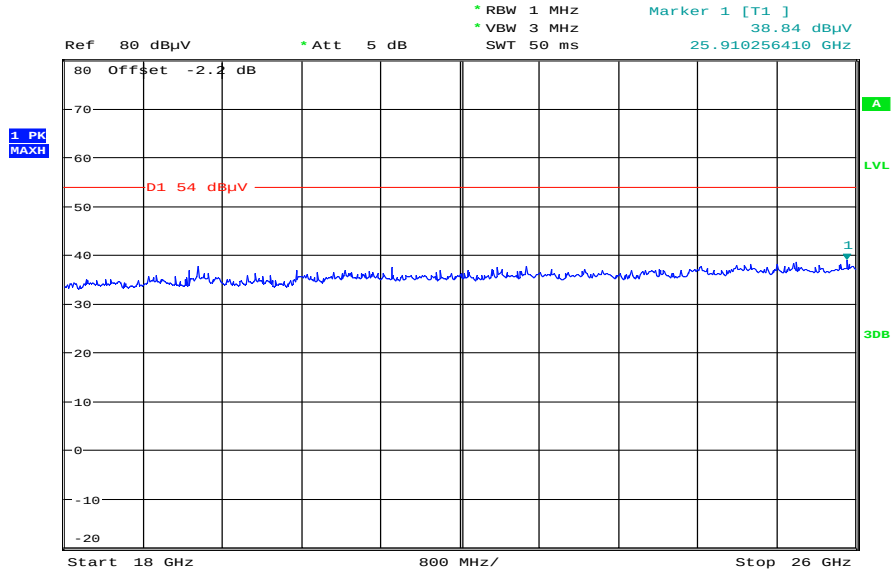


Plot 13: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



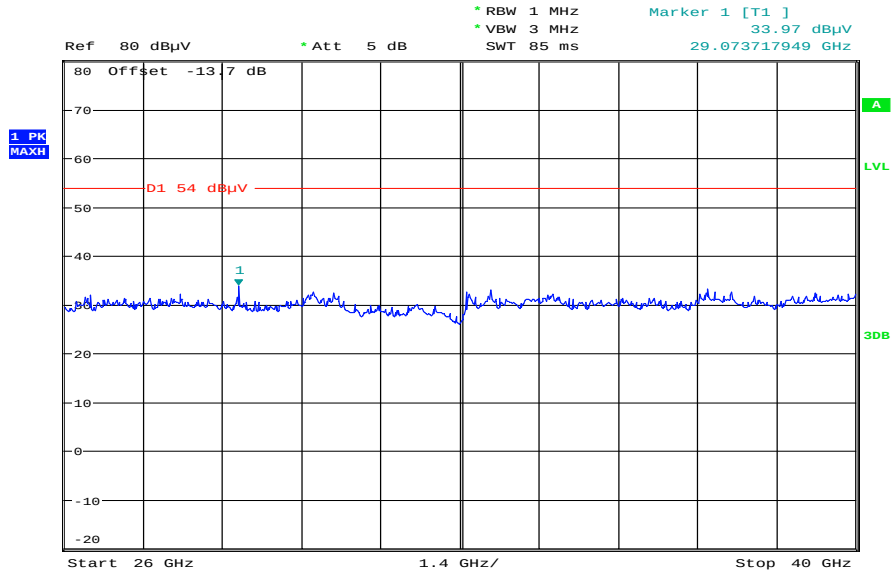
Date: 24.OCT.2013 14:32:07

Plot 14: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:15:32

Plot 15: Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:28:15

Plots: DSSS, antenna port B, QPSK

Plot 1: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

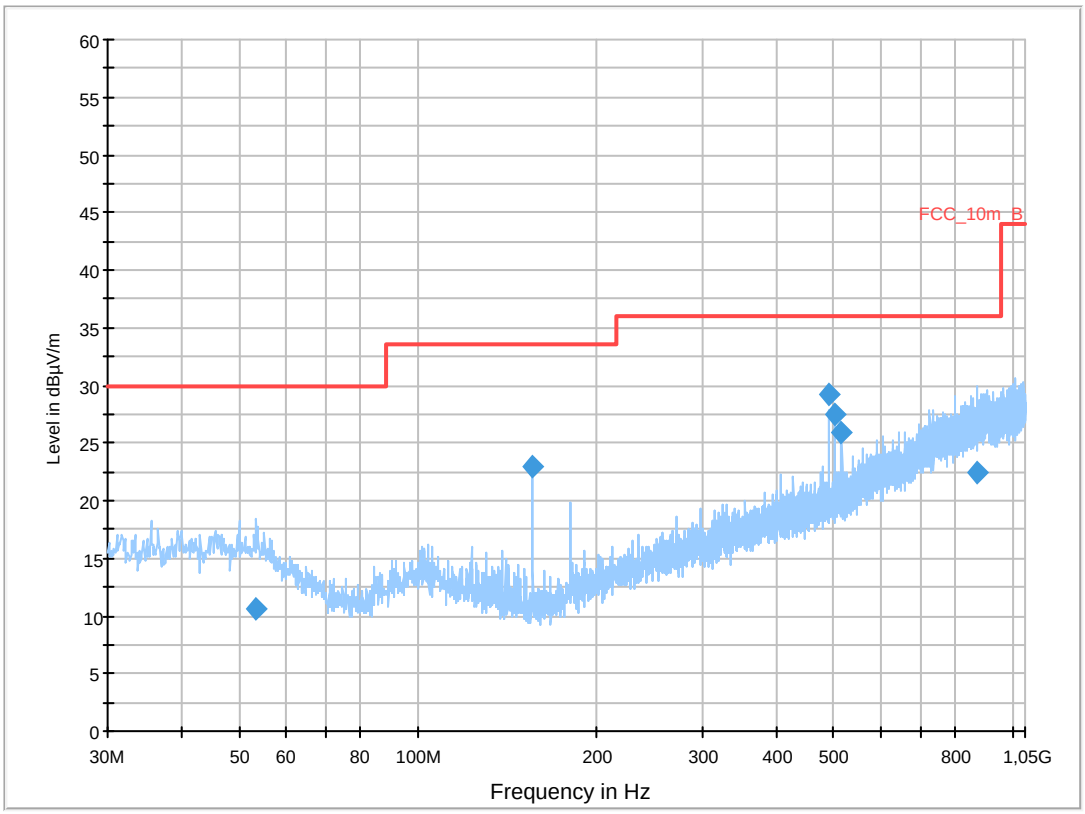
Common Information

Test Description:	FCC part 15 class B
Operating Conditions:	tx @5762MHz Ant. B
Operator Name:	Wolsdorfer
Comment:	AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

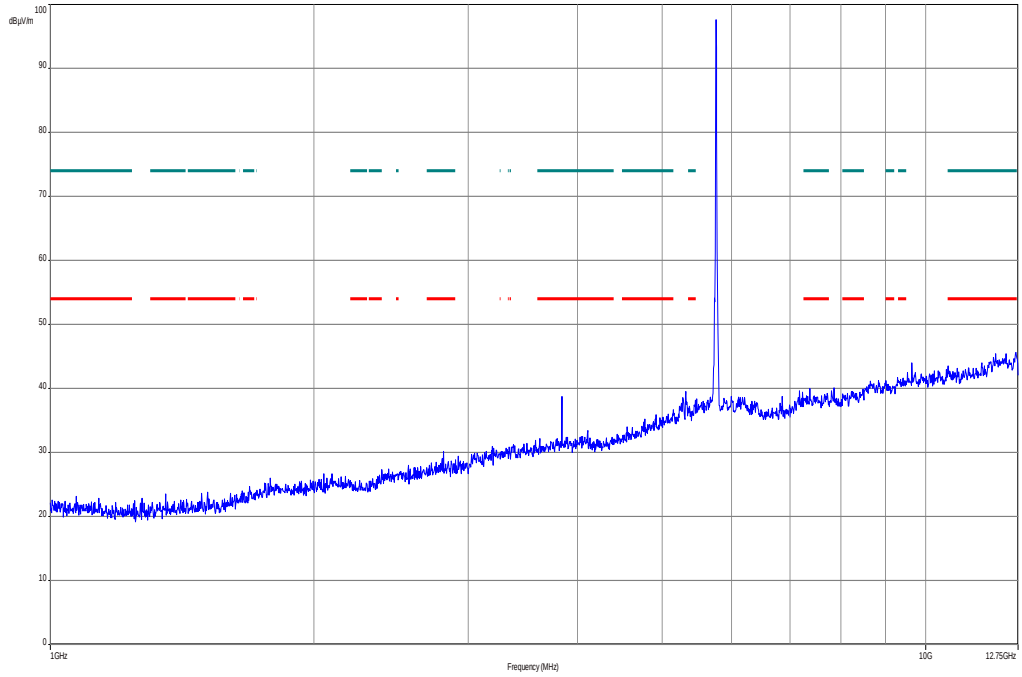
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



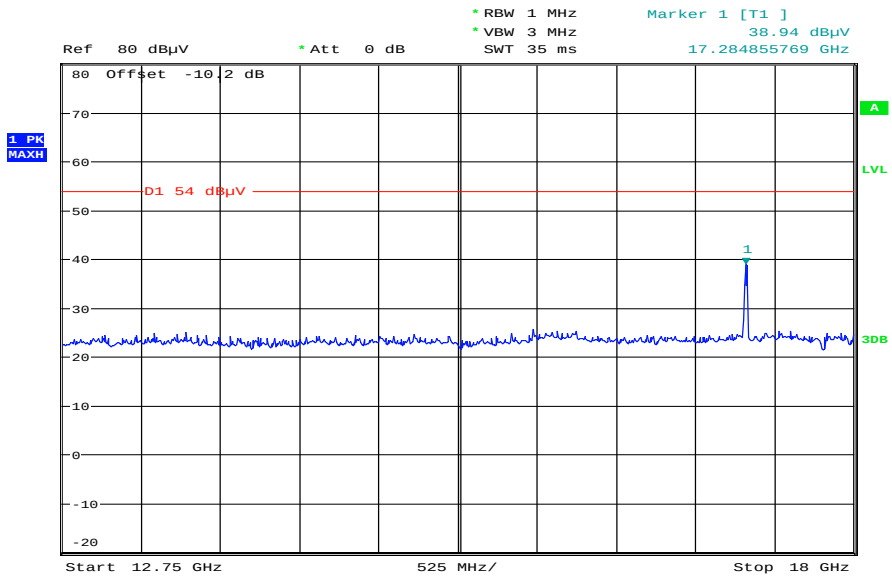
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
53.434200	10.5	1000.0	120.000	170.0	V	190.0	13.0	19.5	30.0	
156.003300	23.0	1000.0	120.000	98.0	V	268.0	9.1	10.5	33.5	
492.003000	29.3	1000.0	120.000	170.0	H	2.0	18.5	6.7	36.0	
503.986200	27.5	1000.0	120.000	160.0	H	-1.0	18.8	8.5	36.0	
515.993550	26.0	1000.0	120.000	170.0	H	-9.0	18.9	10.0	36.0	
870.128100	22.4	1000.0	120.000	170.0	V	182.0	24.8	13.6	36.0	

Plot 2: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

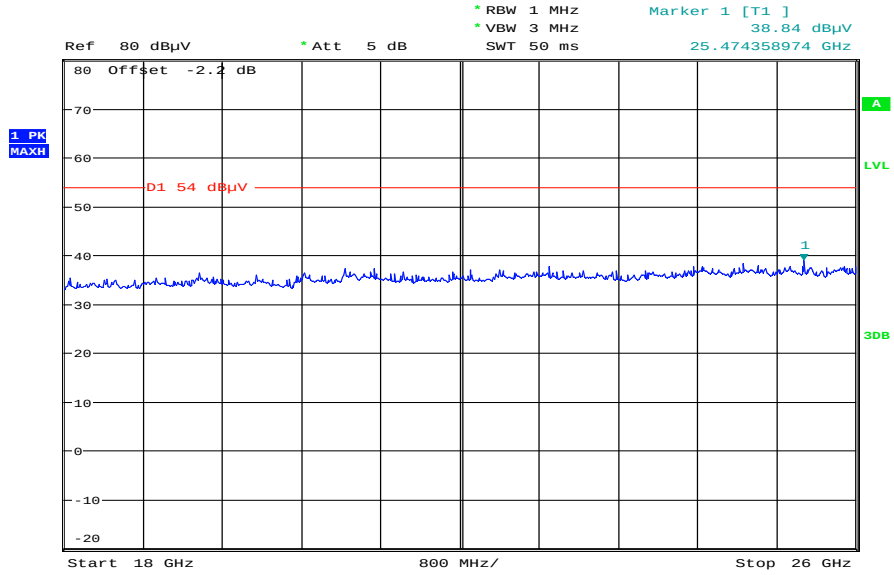


Plot 3: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



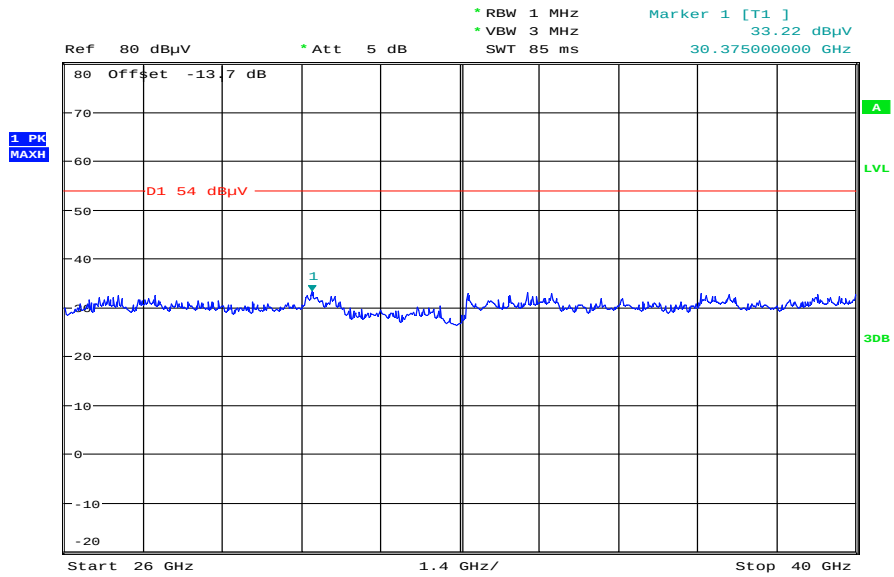
Date: 24.OCT.2013 14:31:06

Plot 4: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:14:22

Plot 5: Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 24.OCT.2013 15:27:28

9.9 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for both modes.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 40 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
RX Spurious Emissions Radiated		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results:

RX Spurious Emissions Radiated [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
No emissions detected above 1 GHz.		
Measurement uncertainty	± 3 dB	

Result: **Passed.**

Plots: RX / Idle – mode

Plot 1: 30 MHz to 1 GHz, vertical & horizontal polarization

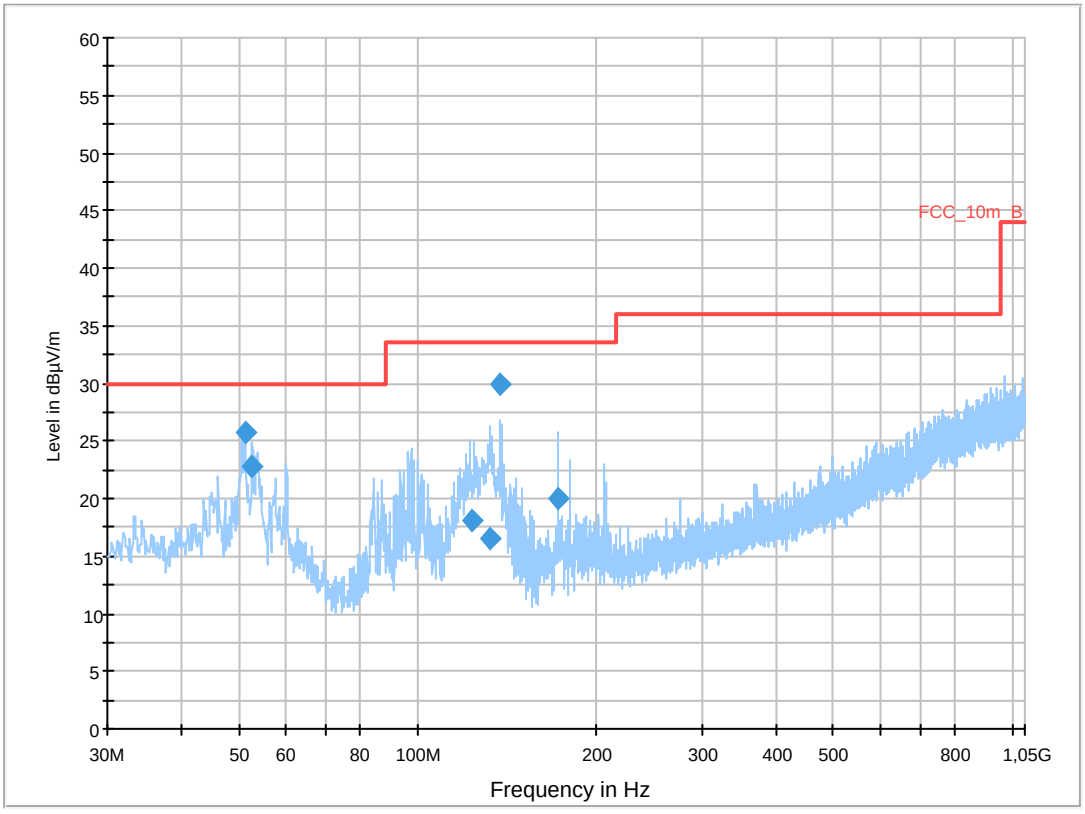
Common Information

EUT:	Quinta MU 3x (Revoluto)
Serial Number:	00001
Test Description:	FCC part 15 C class B @ 10 m
Operating Conditions:	RX + charging
Operator Name:	Wolsdorfer
Comment:	AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

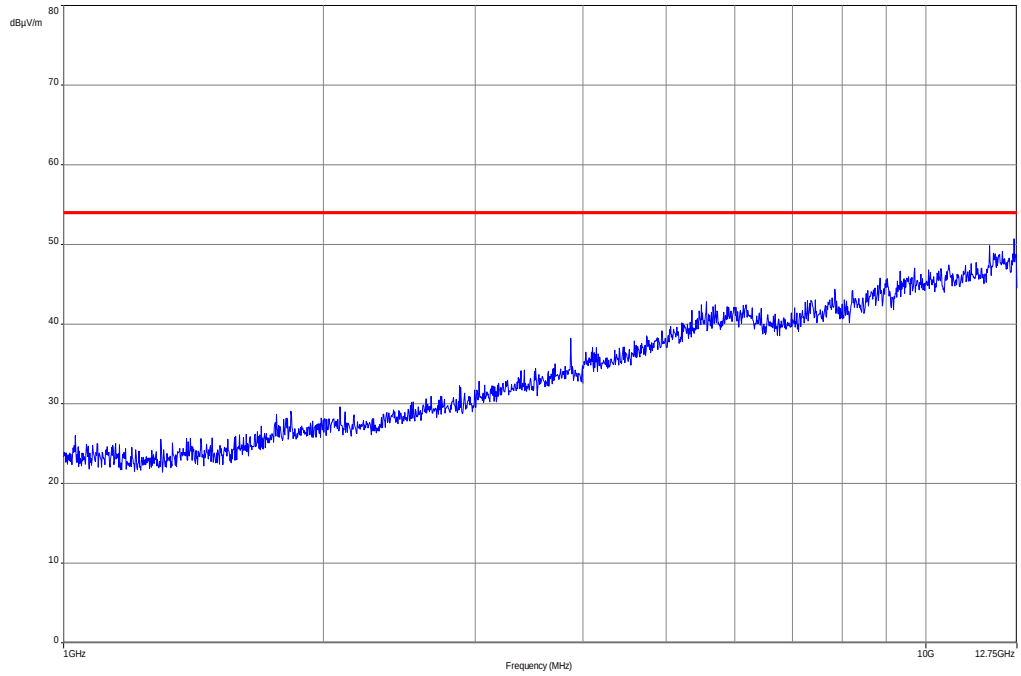
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



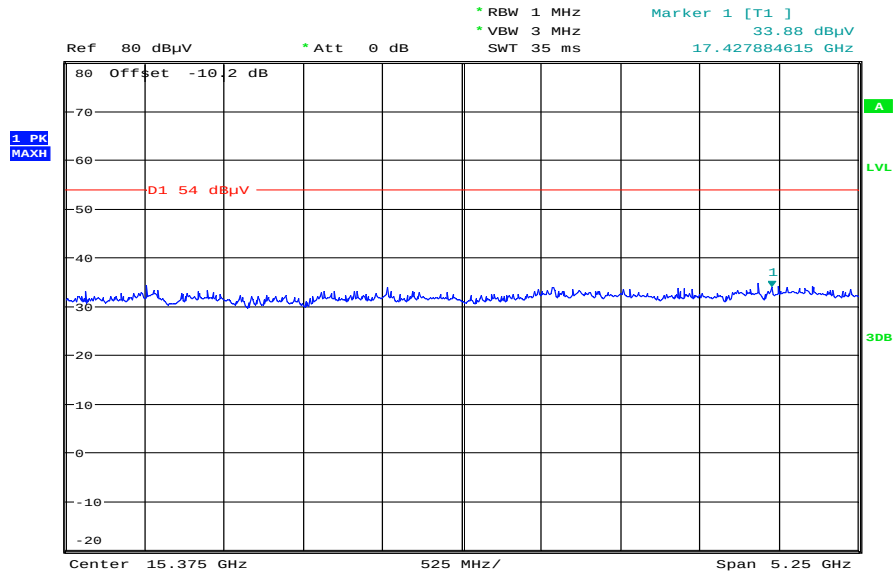
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
51.228300	25.8	1000.0	120.000	98.0	V	190.0	13.2	4.2	30.0	
52.572300	22.9	1000.0	120.000	98.0	V	-10.0	13.1	7.1	30.0	
122.922150	18.0	1000.0	120.000	170.0	V	92.0	10.0	15.5	33.5	
131.873400	16.4	1000.0	120.000	111.0	V	100.0	9.3	17.1	33.5	
137.539800	29.8	1000.0	120.000	170.0	V	81.0	8.8	3.7	33.5	
171.898200	20.1	1000.0	120.000	111.0	V	182.0	9.9	13.4	33.5	

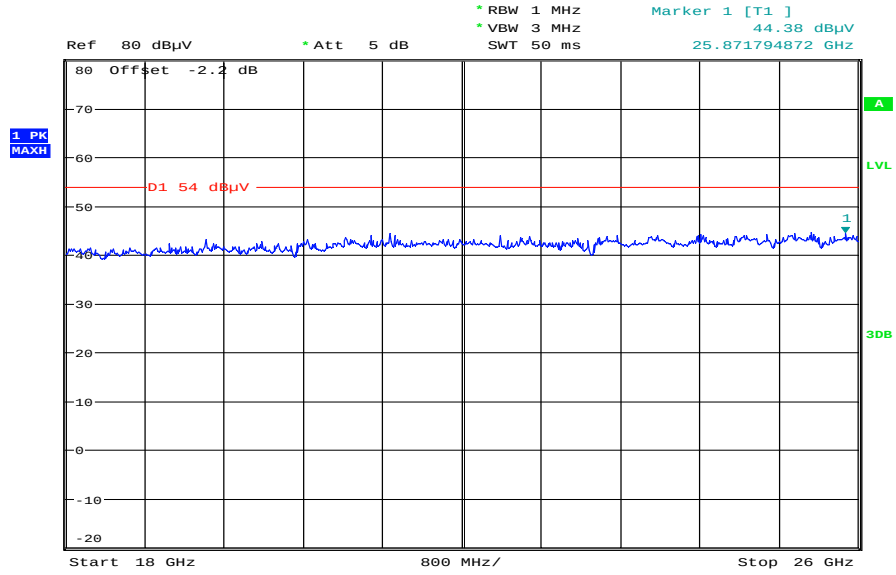
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization

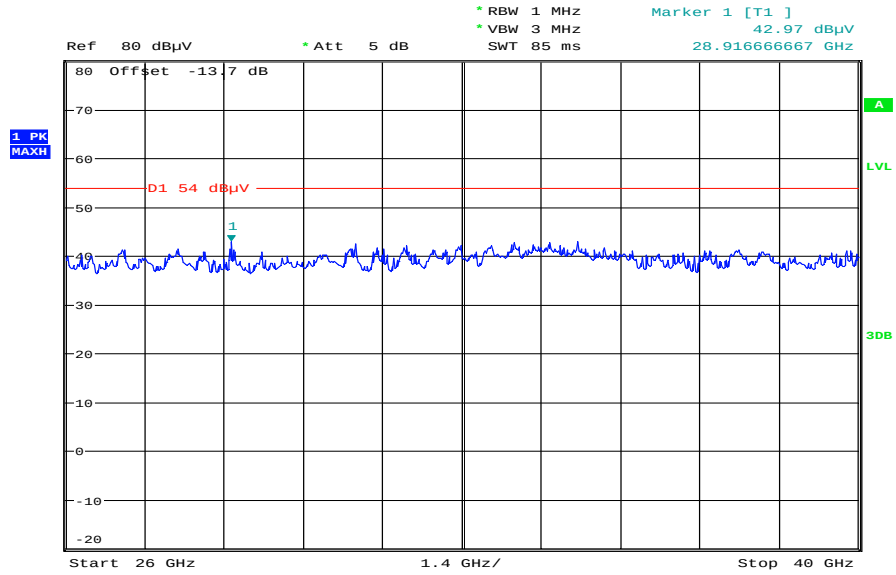


Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:19:25

Plot 5: 26 GHz to 40 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:45:23

9.10 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to mid channel. This measurement is representative for all channels and modes. If peaks are found the lowest channel and the highest channel will be measured too. The measurement is performed with the data rate producing the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
TX Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

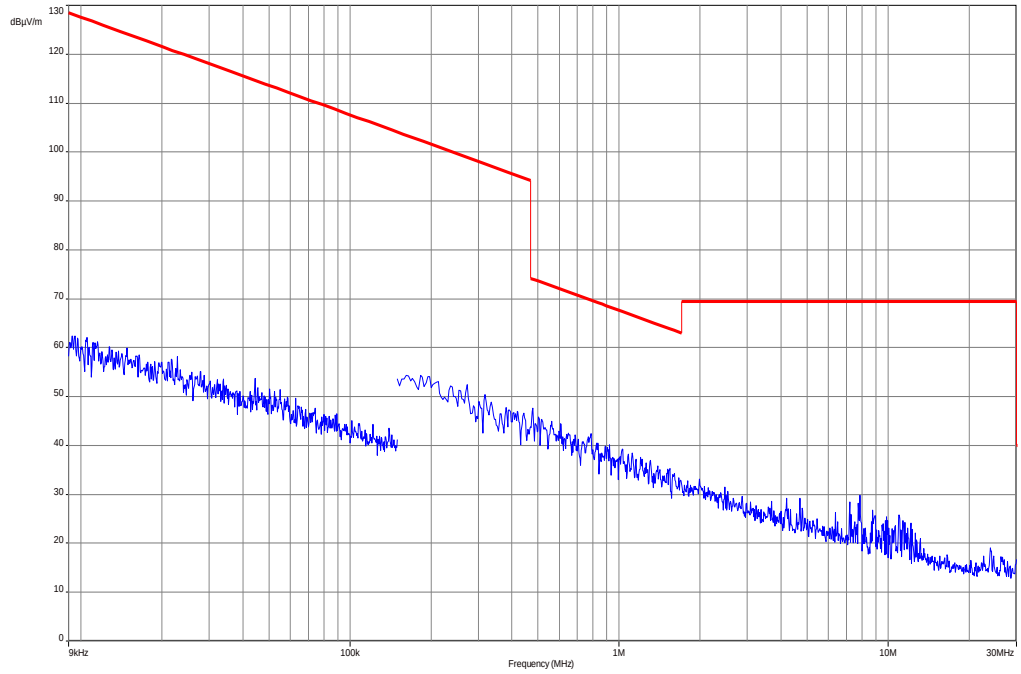
Results:

TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

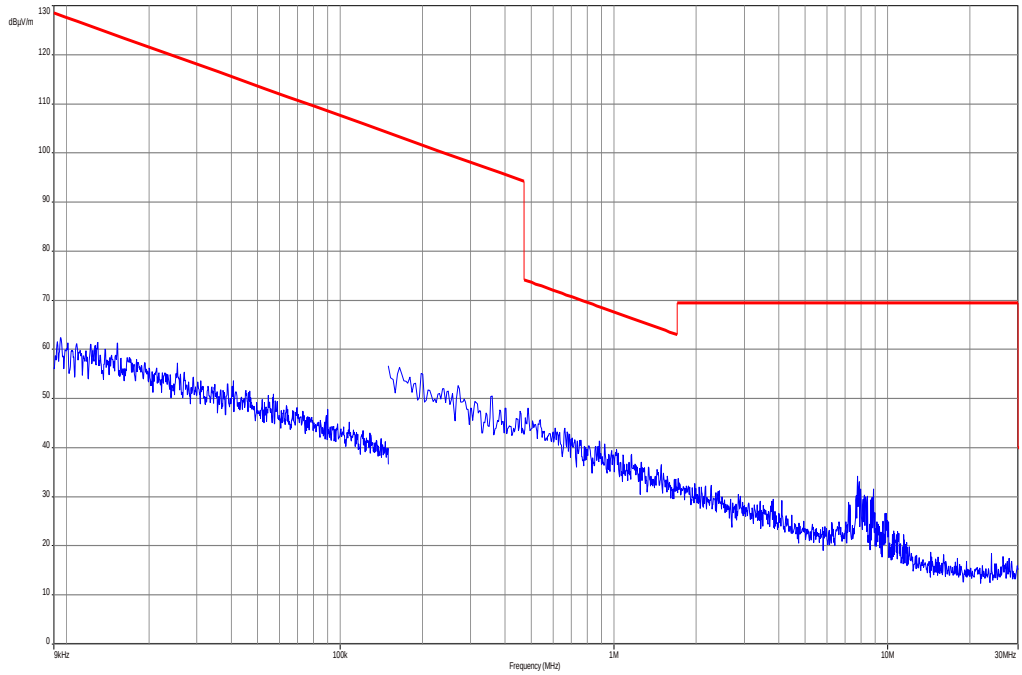
Result: Passed

Plots: TX mode

Plot 1: 9 kHz to 30 MHz, BPSK

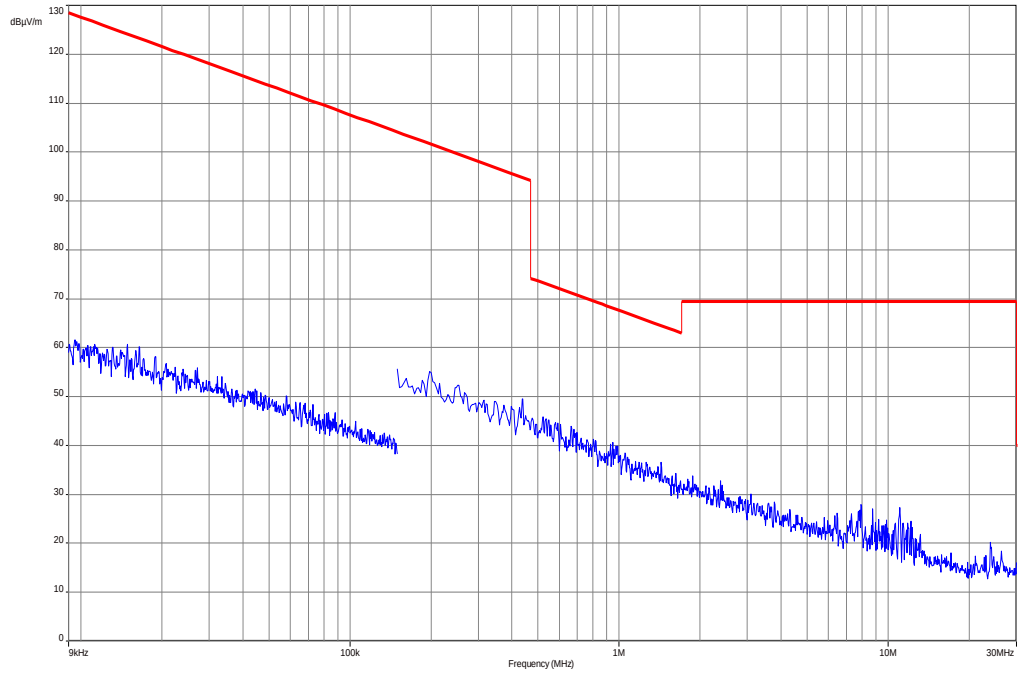


Plot 2: 9 kHz to 30 MHz, QPSK



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



9.11 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to mid channel. If peaks are found the lowest channel and the highest channel will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
TX Spurious Emissions Conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dBµV/m)	Average (dBµV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

*Decreases with the logarithm of the frequency

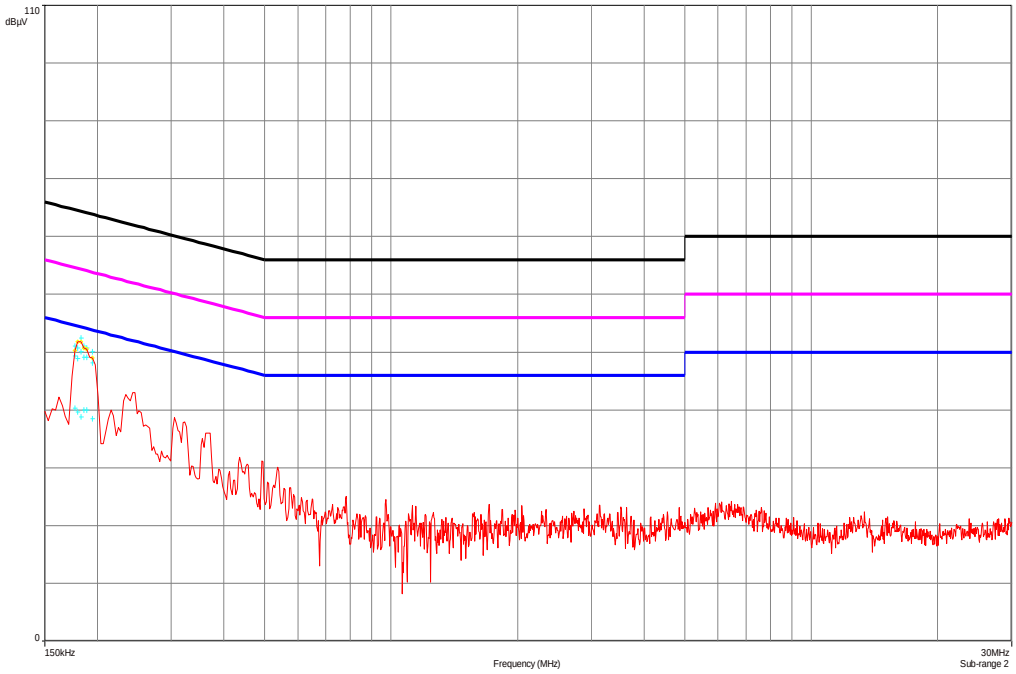
Results:

TX Spurious Emissions Conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

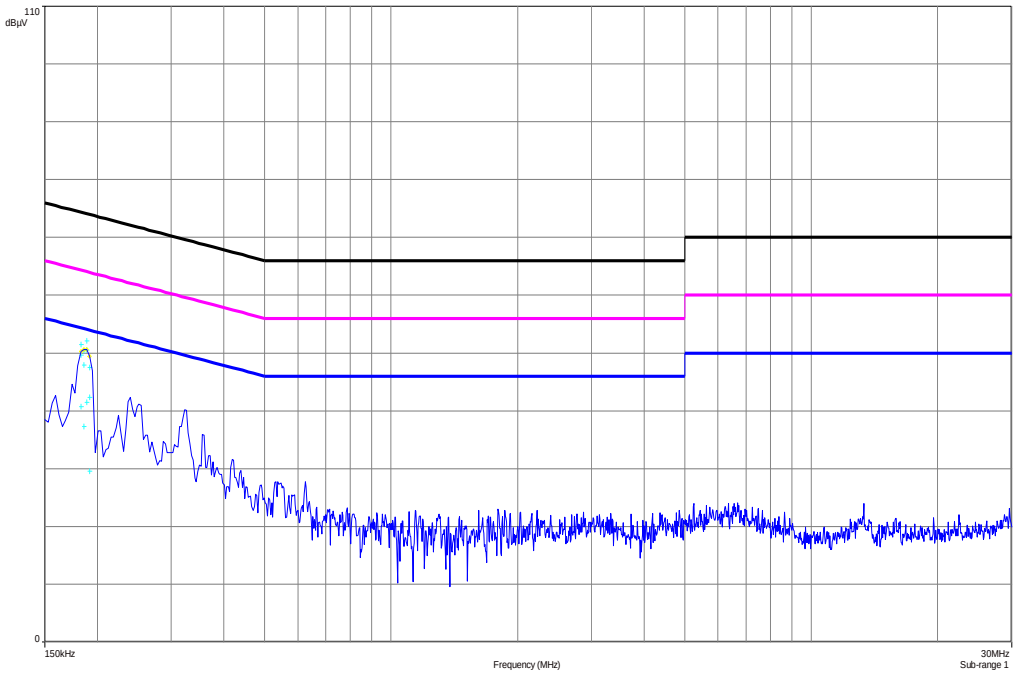
Result: **Passed**

Plots:

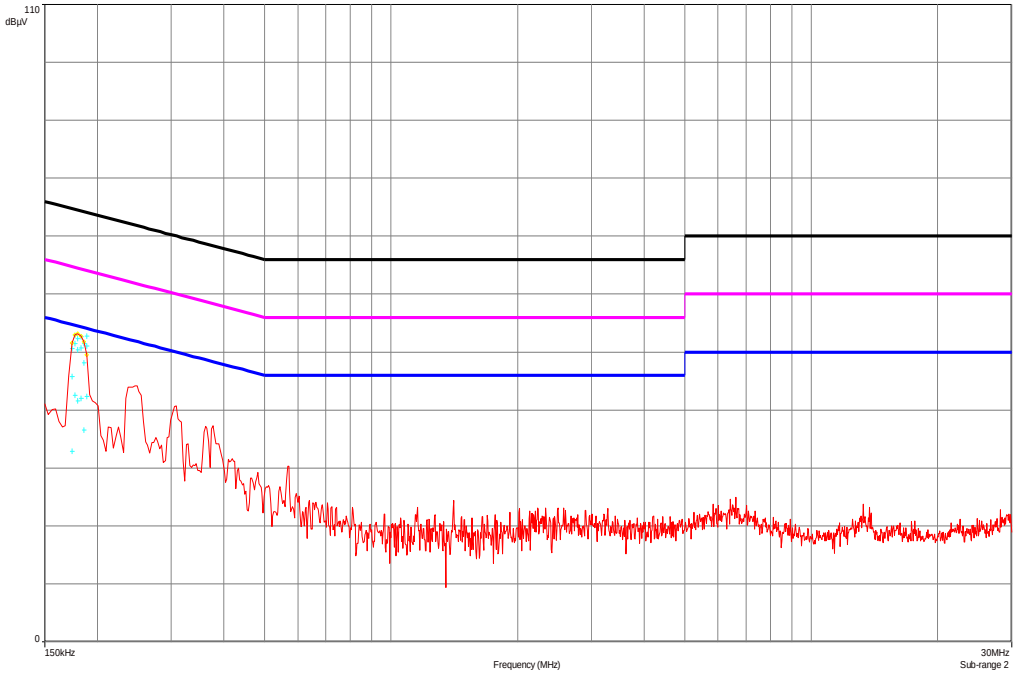
Plot 1: TX mode, 150 kHz to 30 MHz, phase line (valid for both modulations)



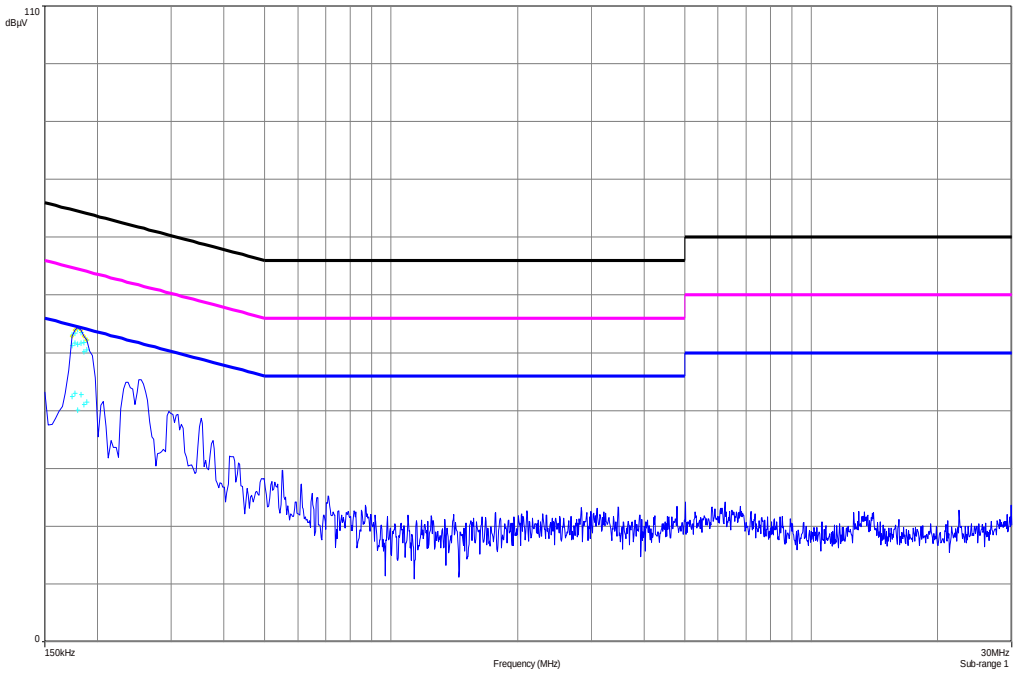
Plot 2: TX mode, 150 kHz to 30 MHz, neutral line (valid for both modulations)



Plot 3: RX / Idle – mode, 150 kHz to 30 MHz, phase line



Plot 4: RX / Idle – mode, 150 kHz to 30 MHz, neutral line



10 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	09.01.2013	09.01.2014
5	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	14.07.2012	14.07.2014
6	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	12.04.2012	12.04.2014
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	16.01.2013	16.01.2014
12	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
13	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKI!	08.05.2013	08.05.2015
14	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
15	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
16	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
17	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
18	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
19	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
20	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
21	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKI!	14.10.2011	14.10.2014
22	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014

23	CR 79	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751	ne		
24	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
25	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000787	ne		
26	A028	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300002440	ne		
27	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014
28	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		
29	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2013	22.10.2014

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkI!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

11 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-05-21
A	New model name; RSP100 changed	2013-06-17
B	Added new modulation	2013-10-26
C	Editorial changings	2013-10-29

Annex B Further information

Glossary

AVG - Average
DUT - Device under test
EMC - Electromagnetic Compatibility
EN - European Standard
EUT - Equipment under test
ETSI - European Telecommunications Standard Institute
FCC - Federal Communication Commission
FCC ID - Company Identifier at FCC
HW - Hardware
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software

Annex C Accreditation Certificate

Front side of certificate

DAkkS Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung

Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi- Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: **D-PL-12076-01-01**

Frankfurt am Main, 18.01.2013

Im Auftrag
Dr.-Ing. (FH) Ralf Egner
Abteilungsleiter

Siehe Hinweise auf der Rückseite

Back side of certificate

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Die DAkkS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

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